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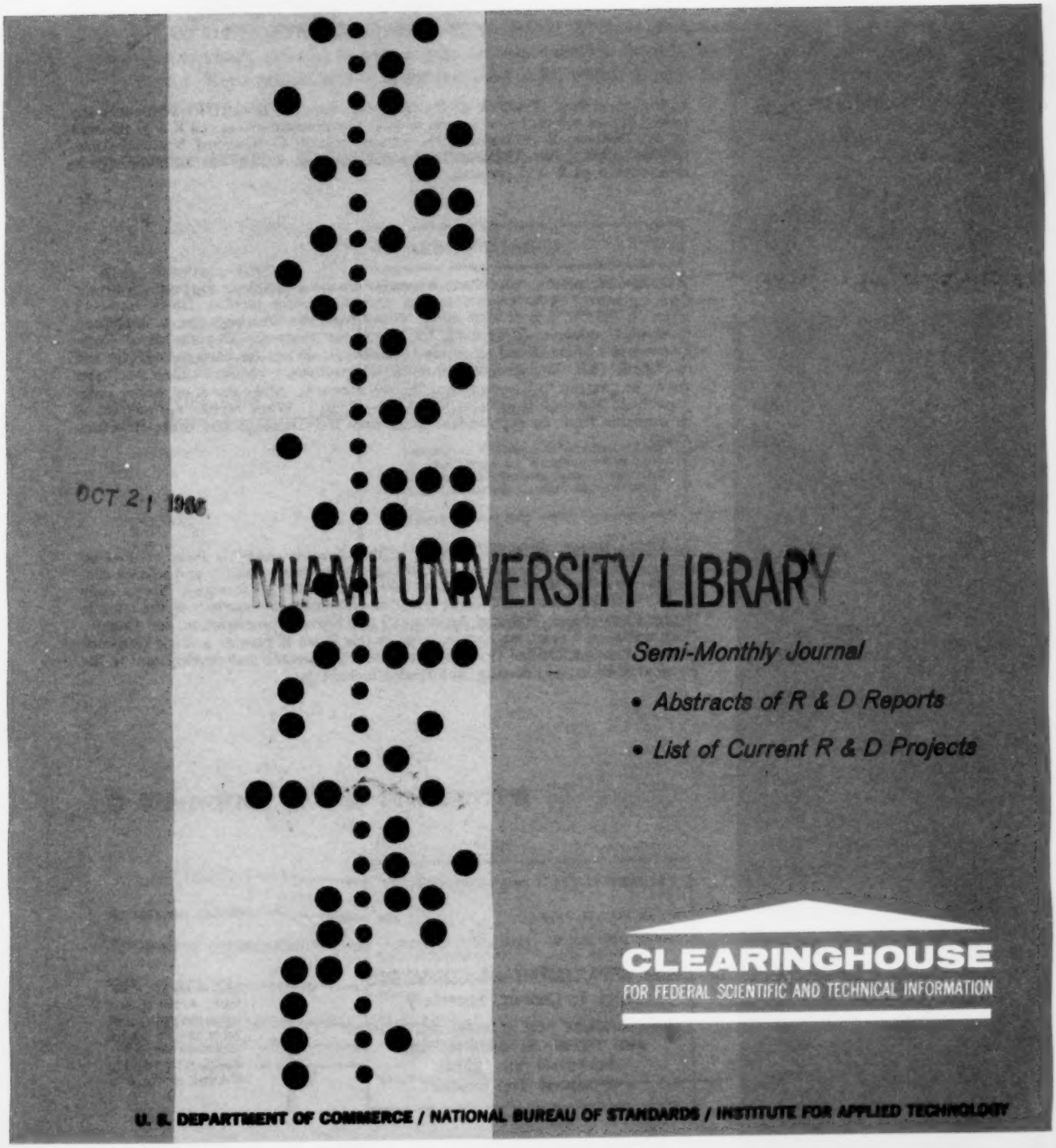
August 25, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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- *Abstracts of R & D Reports*
- *List of Current R & D Projects*

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

August 25, 1966 / Volume 41, Number 16

U.S. Government RESEARCH AND DEVELOPMENT REPORTS

Published semi-monthly by the Clearinghouse for Federal Scientific and Technical Information. Annual subscription $30.00 ($37.50 foreign). Single copy $2.25. Domestic and foreign air mail charges will be quoted on request. Make remittance payable to National Bureau of Standards—CFSTI and mail either to a U.S. Department of Commerce Field Office or to the Clearinghouse, Springfield, Va., 22151. Address changes should be sent to the Clearinghouse.

PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies. It also lists current Government-sponsored R & D projects.

TO ORDER REPORTS

With few exceptions, reports announced herein are available to the public from the Clearinghouse. Order reports by the accession/report number (stock number) given on the first line of each entry. Order from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Department of Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche (MF) are given in the entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Make check or money order payable to National Bureau of Standards—CFSTI. When reports are announced as available from an organization other than the Clearinghouse, order from that source.

INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $1.75. Indexing data from recent issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

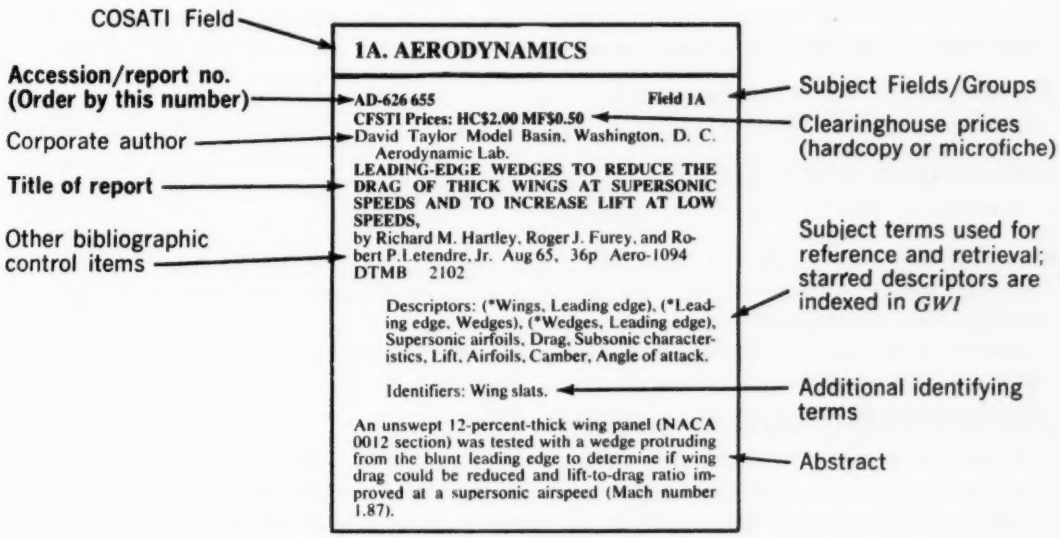
CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

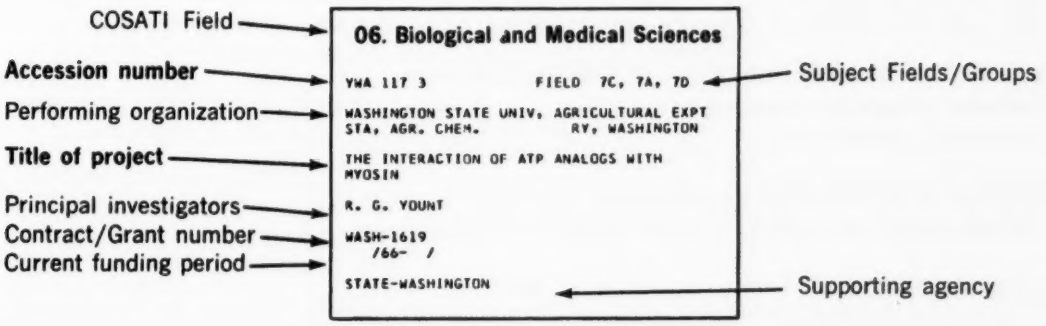
USGRDR FORMAT

Entries are arranged under 22 subject categories called FIELDS. In the entry, sub-categories called GROUPS and occasionally sub-groupings are also indicated. This system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The COSATI Subject Category List, AD 612 200, is available from the Clearinghouse at $1.00. Documents are listed alpha-numerically (that is, alphabetic data precedes numerical data) by accession/report number. Key segments of information contained in the entries are identified diagrammatically below.

● RESEARCH & DEVELOPMENT REPORTS


COSATI Field
1A. AERODYNAMICS
Accession/report no. (Order by this number)
AD-626 655
Field 1A
Subject Fields/Groups
CFSTI Prices: HC$2.00 MF$0.50
Clearinghouse prices (hardcopy or microfiche)
Corporate author
David Taylor Model Basin, Washington, D. C. Aerodynamic Lab.
Title of report
LEADING-EDGE WEDGES TO REDUCE THE DRAG OF THICK WINGS AT SUPERSONIC SPEEDS AND TO INCREASE LIFT AT LOW SPEEDS,
Other bibliographic control items
by Richard M. Hartley, Roger J. Furey, and Robert P. Letendre, Jr. Aug 65, 36p Aero-1094 DTMB 2102
Subject terms used for reference and retrieval; starred descriptors are indexed in GWI
Descriptors: (*Wings, Leading edge), (*Leading edge, Wedges), (*Wedges, Leading edge), Supersonic airfoils, Drag, Subsonic characteristics, Lift, Airfoils, Camber, Angle of attack.
Identifiers: Wing slats.
Additional identifying terms
An unswept 12-percent-thick wing panel (NACA 0012 section) was tested with a wedge protruding from the blunt leading edge to determine if wing drag could be reduced and lift-to-drag ratio improved at a supersonic airspeed (Mach number 1.87).
Abstract

● CURRENT R & D PROJECTS



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01 AERONAUTICS 1
Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE 4
Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 4
Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES 6
Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES 11
Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

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07 CHEMISTRY 31
Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY 35
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09 ELECTRONICS AND ELECTRICAL ENGINEERING 41
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10 ENERGY CONVERSION (Non-Propulsive) 51
Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

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11 MATERIALS 53

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES 61

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13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING 64

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14 METHODS AND EQUIPMENT 73

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15 MILITARY SCIENCES 76

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY 78

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17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES 78

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18 NUCLEAR SCIENCE AND TECHNOLOGY 82

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Electronics

PROBLEM AREAS IN MICROCIRCUITRY FIELD PROBED

(Order Stock No. N66-19387 Survey/Study of the Interconnection Problem in Microelectronics, HC $3.00/MF $0.50.)

The Space Agency has sponsored a survey and study to evaluate the state of the microelectronics art with emphasis on the interconnection problem, particularly as it relates to systems reliability. During the course of the study, pertinent groups and individuals were contacted in the NASA centers, military facilities, and in the plants of both systems and component manufacturers. The interviews were used to determine the trends in the microcircuitry field and, from these trends, to determine the weak spots or areas where further attention is warranted. Moore-Peterson Associates of Santa Barbara, Calif., who undertook the study, believes that as special attention is given to these areas, the state-of-the-art of microelectronics will be advanced in a manner that will particularly help NASA and other procurement agencies. Furthermore, the field of microelectronics as a whole will be strengthened. The Moore-Peterson report covers logic considerations, the multiple function chip, multiple chip

assembly, microcircuit package, multi-layer board, the interconnection bond, connector, systems design, component and systems reliability, and management considerations. In management considerations, the authors have tabulated those points regarding the current state-of-the-art of microcircuitry which they feel should be most valuable to management officers and personnel.

DURABLE MASKS FOR MICROCIRCUITRY DEVELOPED

(Order Stock No. AD-634 762 Chromium Masks for Microcircuitry, HC $1.00/MF $0.50.)

The Fort Monmouth Electronics Command has developed a method for preparing durable chromium films which may be used as masks in making photoresist patterns for microcircuitry. The Electronics Command notes that the preparation of masks is a tedious and expensive operation, and the use of a durable and permanent material in mask fabrication is highly advantageous. The adherent films were deposited on glass slides using electron beam evaporation techniques from a fused chromium powder source. The films showed excellent adhesion to glass and silicon slides, produced good uniform and reproducible patterns, were free from pinholes, and were easily etched. Micropatterns were prepared by the use of conventional photoresist techniques, followed by an etch and heat treatment. In addition, the masks had good line definitions. They can be used unlimited times without being scratched or defaced for obtaining contact exposures of photoresist film.

Engineering and Construction

BUREAU OF PUBLIC ROADS HIGHWAY ENGINEERING REPORTS

The following studies covering a variety of aspects of highway engineering and construction were carried out by State Highway Departments and Departments of Civil Engineering of Colleges in cooperation with the Bureau of Public Roads, U. S. Department of Commerce.

(PB-169 819 Development of Equipment and Techniques for a Statewide Rigid Pavement Deflection Study, HC $3.00/MF $0.75;

PB-169 515 Fifth Annual Performance Survey of Reinforced Concrete Pipe Culverts, HC $3.00/MF $0.75;

PB-169 818 Development of a Skid Test Trailer, HC $2.00/MF $0.50;

PB-169 816 Effects of Carbide Studded Tires on Roadway Surfaces, HC $4.00/MF $0.75;

PB-169 516 Strength Characteristics of Compacted Soils, HC $3.00/MF $0.75;

PB-169 513 Dynamic Full Scale Impact Tests of Cable Type Median Barriers, HC $3.00/MF $0.75;

PB-169 487 Highway and Agricultural Drainage Practices, HC $5.00/MF $1.00;

PB-169 836 Methodology of International Highway Research and Development Exchange, HC $3.00/MF $0.75;

PB-169 489 An Evaluation of Color Aerial Photography for Engineering Purposes, HC $3.00/MF $0.75;

PB-169 504 A Report: Virginia's Training Program for Graduate Engineers, HC $6.00/ MF$1.25;

PB-169 817 Evaluation of Single Axle Load Response on an Experimental Continuously Reinforced Concrete Pavement, HC $2.00/MF $0.50;

PB-169 823 An Investigation of Asphalt Cement Subsealing and Lime-Cement Jacking, HC $2.00/MF $0.50;

PB-169 505 Preliminary Investigation of the Mechanical Behavior of Idealized Aggregate-Asphalt Composites, HC $2.00/MF $0.50;

PB-169 480 An Improved Particle Index Test for the Evaluation of Geometric Characteristics of Aggregates, HC $3.00/MF $0.50;

PB-169 820 Accelerometer Method of Riding Quality Testing, HC $2.00/MF $0.50;

PB-169 483 A Study of the Relation Between the Particle Index of the Aggregate and the Properties of Bituminous Aggregate Mixtures, HC $2.00/MF $0.50;

PB-169 491 The Development of a New Method for Determining Certain Physical Properties of Aggregates Without Using the Specific Gravity of Solids as a Function, HC $4.00/MF $1.00.)

(See group of related reports under Transportation category.)

Information Technology

BATTELLE AD HOC FORUM PAPERS PUBLISHED

(Order Stock No. CONF-651131 Proceedings of First Ad Hoc Forum of Scientific and Technical Information Analysis Center Managers, Directors, and Professional Analysts, HC $2.00/MF $1.00.)

The Proceedings, published by the Atomic Energy Commission, consists of 13 papers delivered by specialists from industry, Government, and university information analysis center directors and managers. The First Ad Hoc Forum was held at Battelle Memorial Institute, Columbus, Ohio, Nov. 9-11, 1965, and was sponsored by Battelle and the Oak Ridge National Laboratory. The conference clearly brought out that there are many unresolved problems, particularly in regard to the integration of a nationwide information network.

In his Keynote Address to the Forum, William T. Knox, of the Office of Science and Technology, White House, said,"The problem demanding the most attention at the present is the creation of a permanent mechanism for ensuring that we have effective and efficient management of this vast and far-flung and almost incredibly complicated series of functions that together make up this national information network. We have considered a COMSAT-like corporation

that would be deeply involved in the actual operation, serving both government and non-government interests; a new Federal agency that would manage the scientific functions of all Federal agencies just as the General Administrative Services handles all administrative services for other agencies; a new Federal agency restricted to top planning and evaluation, a top management agency, or perhaps assignment of top level management functions to an existing Federal agency. These and other alternatives, too, are being examined at present. It is no simple problem and there will be no simple answer."

DIRECTORY COMPILED OF SPECIALIZED INFORMATION SERVICES

(Order Stock No. CONF-651131(APP.) Directory of Selected Specialized Information Services, Ad Hoc Forum of Scientific and Technical Information Analysis Center Managers, Directors, and Professional Analysts, HC $1.50/MF $1.00.)

A directory of selected specialized information services in the United States lists brief descriptions of the activities of 65 organizations or projects. In some cases the services are restricted to users with qualifications, such as security clearances, company employment, or society membership. All of the listed services report some element of specialization in subject area, type of service provided, or some other aspect. The Directory is designed to be used as a direct reference aid by working scientists and engineers; however, it should also prove useful to librarians, documentalists, and others who assist the technical man in locating scientific and technological information.

Transportation (Land, Sea, Air, Space)

BUREAU OF PUBLIC ROADS REPORTS ON HIGHWAYS AND TRAFFIC

The following studies were carried out by State Highway Departments and Departments of Civil Engineering of Colleges in cooperation with the Bureau of Public Roads, U. S. Department of Commerce:

(PB-169 824 Application of the Critical Path Method of Management Control to Highway Programming, HC $8.20/MF $2.25;

PB-169 861 The Roles of Carbon Monoxide, Alcohol and Drugs in Fatal Single Car Accidents, HC $2.00/MF $0.50;

PB-169 821 Surveillance of Accident Locations by Electronic Data Processing Methods, HC $3.00/MF $0.75;

PB-169 486 Farms and New Highways: Problems and Adjustments, HC $2.00/MF $0.50;

PB-169 858 Effect of Television Surveillance on Police Response Time to an

Urban Freeway Incident, HC $2.00/MF $0.50;

PB-169 859 A Study of Sampling Error in Spot and Travel Speeds, HC $4.00/MF $0.75;

PB-169 860 Analysis of Access Violations on Controlled Access Facilities, HC $3.00/MF $0.75;

PB-169 862 Development of an Expeditious Method for Off-Site Testing of Freeway Sign Formats, HC $1.00/MF $0.50;

PB-169 863 Signing a Freeway-to-Freeway Interchange, HC $1.00/MF $0.50;

PB-170 766 Traffic Control and Roadway Elements, Their Relationship to Highway Safety, HC $4.00/MF $0.75;

PB-170 765 Highway Safety Research Organizations and Resources in the United States, HC $2.00/MF $0.50.)

(See group of related reports under Engineering and Construction category.)

NEW YORK TO BOSTON IN 2 1/2 HOURS VIA HIGH-SPEED RAIL

(Order Stock No. PB-169 907 Preliminary Engineering Report on Possible Improvements to Railroad Passenger Service Between New York and Boston, HC $6.00/MF $1.50.)

Future hourly rail passenger service between New York and Boston could use 150 mph trains and make the run in 2 1/2 hours, according to an engineering report made for the Northeast Corridor Transportation Project of the U. S. Department of Commerce. Insofar as possible, the study contemplates using the right-of-way traveled by the present New York to Boston trains of the New York, New Haven and Hartford Railroad. The report is a companion to earlier surveys on improving rail passenger service between Washington and New York which would make possible a Washington-Boston trip of 4 1/2 hours total travel time -- a run that now takes almost 8 hours.

Wood and Paper

IRRADIATED WOOD-PLASTICS PROMISING INDUSTRY FOR NORTHEAST

(Order Stock No. NYO-3569-1 Commercialization Studies on Wood-Plastic Combinations Process, HC $1.75/MF $1.00.)

The commercial potential of irradiated wood-plastic combinations (WPC) in the Northeastern United States is promising, according to a report made to the Atomic Energy Commission by the Western New York Nuclear Research Center of Buffalo. The report says there is a sufficient volume of production of various wood products in the Northeast for industry to consider establishing radiation-polymerization processing facilities for WPC. It indicates that among the numerous products of the wood industries that are most suitable for introduction in Northeastern commercial markets are hardwood flooring, industrial patterns and dies, shapings and turnings, and commercial and institutional furniture.

Processing plants for wood-plastic conversion might easily be located in the Northeast at points convenient to major complexes of wood manufacturers. The report names the most likely regional locations as being in S.E. and N.W. Pennsylvania, S.E. and S.W. New York, and N. New Jersey, but it adds that additional plants may be located at several additional points in the geographic area studied. The difficulty of estimating probable production quantities, however, made further specific regional identifications unfeasible. The study identifies the steps necessary to achieve commercialization of WPC and gives a detailed evaluation of potential regions for the location of processing facilities in the areas mentioned.

20,000 SOUTHERN FIRMS HAVE POTENTIAL USE FOR WOOD-PLASTICS

(Order Stock No. TID-22774 Commercialization of the Process of Manufacturing Radiation Produced Plastic Impregnated Wood in the Southern Region, HC $1.25/MF $0.75.)

Over 20,000 firms have potential use of wood-plastic combinations in the 17 states in the Southern Region of the United States, according to the Southern Interstate Nuclear Board (SINB). The value added by manufacturing in the Region represents about 30 percent of the Nation's total, and there are very few locations in the Region that could not support a plant to process gamma-irradiated, wood-plastic combination (WPC) material. Furthermore, several firms have adequate production to support single product plants. Multiple product plants can turn out a wide variety of WPCs, ranging from baseball bats, pool cues, furniture of every description, plywood, housewares, millwork, windows, and even guitars. Altogether, SINB in this AEC-sponsored study of the Southern Region has investigated 71 products as likely items in the commercialization of the process of manufacturing radiation-polymerization, plastic impregnated wood. The SINB report studied the current status of WPC and exposed their findings to a large number of selected industrialists for their consideration with regard to commercial applications of the new material. This made it possible to identify specific needs and conditions required for commercialization, and to exchange the technology of pertinent subjects in several, single day forums. The report covers economic aspects, the AEC program, production facility needs, evaluations of industrial furniture and sporting goods, and product and market definition. It goes into the production plant economics of wood-plastics and the curing of wood chemical combinations.

SYMPOSIUM PAPERS PUBLISHED ON NONDESTRUCTIVE TESTING OF WOOD

(Order Stock No. PB-170 698 Second Symposium on the Nondestructive Testing of Wood, HC $8.50/MF $2.25.)

The Proceedings of the Second Symposium on Nondestructive Testing of Wood held at Spokane, Wash., in April 1965 have been published in a 550-page volume. Sponsored by Washington State University and supported by a National Science Foundation grant, the Symposium was expanded to international scope to embrace the latest world thought on nondestructive testing of forest products. Scientists and engineers presented 24 papers covering the fields of nondestructive testing from science to the marketplace, fundamentals, research and development,

elasticity vs. strength relationships for lumber, and the present status of nondestructive testing for wood. The publication concludes with a summary of the symposium's five sessions.

FOREST PRODUCTS LABORATORY CREATES NEW MARKETS

(Order Stock No. PB-170 407 Annual Report of Research at the Forest Products Laboratory for 1965, HC $3.00/MF $0.50.)

The U.S. Forest Products Laboratory Annual Report for 1965 indicates noteworthy achievements in furthering the goal of maintaining and creating new markets for wood. Among those "achievements which would stimulate optimism for the future growth of the forest industries" are: a new concept of house design based on six components planned for mass production and fast site assembly, and made principally from conventional wood building materials; a promising new method of predicting by computer the yields of cuttings possible from standard hardwood lumber grades, specifying most economical grades, and providing sawing instructions; a new natural finish system of exceptional promise for exterior service; and red oak wall paneling and flooring produced from low-grade logs and uniquely colored by a new press-drying process. Other accomplishments: an alkaline sulfite chemimechanical pulping process for producing brighter groundwood-type pulps from hardwoods; two processes for recovering chemicals from spent liquors of neutral sulfite semichemical pulping processes, thereby improving process economy and reducing pollution; and establishment of thermal insulating properties of fiberboards and particle boards for industry guidance. FPL also reports on a new board product, studies of fire spread in building interiors, and research findings of two timber density surveys -- one of southern pines and the other western woods. These and other examples of research progress are discussed in the report.

The following Forest Products Laboratory reports on wood and paper products are also available in the Clearinghouse collection:

PB-170 604 Surface Characteristics of Wood as They Affect Durability of Finishes, HC $3.00/MF $0.75;

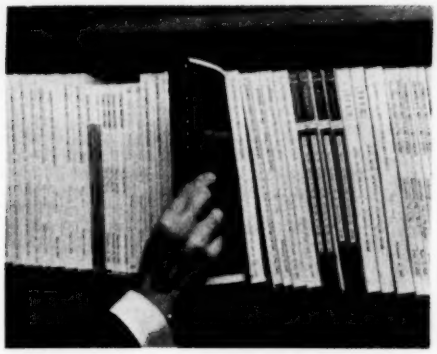
PB-170 625 Paneling and Flooring From Low-Grade Hardwood Logs, HC $2.00/MF $0.50;

PB-170 396 Parameters for Predicting Maximum Surface Temperatures of Wood in Exterior Exposures, HC $1.00/MF $0.50;

PB-170 626 Effect of Loading Rate on the Edgewise Compressive Strength of Corrugated Fiberboard, HC $1.00/MF $0.50;

PB-170 398 Effect of Size on Bending Strength of Wood Members, HC $2.00/MF $0.50;

PB-170 606 Estimating Tree Specific Gravity of Maine Conifers, HC $1.00/MF $0.50.



REPORT
selection aids

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U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS—semimonthly journal announcing R & D reports and listing selected current R & D projects. Annual subscription $30.00 ($37.50 foreign mailing). Single copy $2.25. Order from Clearinghouse, Springfield, Va. 22151.

TECHNICAL TRANSLATIONS—semimonthly foreign technical literature announcement journal listing Government and private sources. Annual subscription $12, add $4 for foreign mailing, single copy 60 cents. Order from Superintendent of Documents, U. S. Government Printing Office.

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SB-475 (Suppl. 2) Information, Storage and Retrieval
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SB-543 Numerical Control Tool Systems
SB-544 Life Testing of Materials
SB-546 Space Environmental Conditions (Materials)
SB-547 Cryogenics

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OTR-128 Plastic coatings
OTR-129 Brazing Technology and Application
OTR-132 High Temperature Adhesives above 500°F
OTR-139 Flexible, Transparent Packaging Materials

RESEARCH & DEVELOPMENT REPORTS

1A. AERODYNAMICS

AD-431 527 **Field 1A**
CFSTI Price: HC$1.10
RAND Corp., Santa Monica, Calif.
ON TRANSVERSE CURVATURE EFFECTS IN AXI-SYMMETRIC HYPERSONIC BOUNDARY LAYERS,
by Ting-Yi Li, and Joseph F. Gross. Feb 64, 7p P-2872

Descriptors: (*Hypersonic flow, Boundary layer), (*Boundary layer, Axially symmetric flow), Pressure, Mathematical analysis.

N66-15335 **Field 1A**
CFSTI Prices: HC$4.00 MF$1.00
Marquardt Corp., Van Nuys, Calif.
AN INVESTIGATION OF CONTROLLED TETHERING IN SPACE.
by R. W. Adlhoch, and W. H. Straly. 26 Feb 65, 144p Rept. no. 6092
Contract NAS1-3912
NASA-CR-69392

Descriptors: *Tetherline, *Astronaut, *Motion equation, *Retrieval, *Systems analysis.

N66-16026 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Washington Univ., Seattle. Aeronautical Lab.
AN EXPERIMENTAL INVESTIGATION OF FEASIBILITY OF A V/STOL TEST SECTION IN UWAL 8 X 12 WIND TUNNEL BY USING A 1/8 SCALE MODEL OF THE TUNNEL.
by R. G. Joppa, and S. Shindo. 5 Feb 65, 48p
Rept. no. 801
Grant NGR-48-002-010
NASA-CR-69663

Descriptors: *Test facility, *Scale model, *V/stol aircraft, *Wind tunnel model.

N66-16557 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AN INVESTIGATION OF HIGHLY UNDEREXPANDED EXHAUST PLUMES IMPINGING UPON A PERPENDICULAR FLAT SURFACE.
by E. H. Andrews Jr. and A. R. Vick. Feb 66, 57p NASA-TN-D-3269

Descriptors: *Exhaust gas, *Impingement, *Rocket nozzle.

N66-16561 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECT OF NOSE-MOUNTED CONTROL-SYSTEM JETS IN ROLL-CONTROL POSITIONS ON THE AERODYNAMICS OF A SPACE VEHICLE.
by R. L. James Jr, and J. T. Suttles. Feb 66, 28p NASA-TN-D-3282

Descriptors: *Control system, *Jet plume, *Roll control, *Space vehicle, *Two-stage rocket.

N66-16562 **Field 1A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECT OF NACELLE ORIENTATION ON THE AERODYNAMIC CHARACTERISTICS OF AN ARROW WING-BODY CONFIGURATION AT MACH NUMBER 2.03.
by E. J. Landrum. Feb 66, 14p NASA-TN-D-3284

Descriptors: *Aerodynamic characteristics, *Aircraft configuration, *Arrow wing, *Nacelle, *Supersonic transport, *Wing body.

N66-16563 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
FLOW FIELD SURVEY AND DECELERATOR DRAG CHARACTERISTICS IN THE WAKE OF A MODEL OF THE X-15 AIRPLANE AT MACH 2.30 AND 4.65.
by J. F. Campbell. Feb 66, 37p NASA-TN-D-3285

Descriptors: *Wind tunnel, *Deceleration, *Flow field, *X-15 aircraft.

N66-16589 **Field 1A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Resesearch Center.
EFFECTS OF LEADING-EDGE BLUNTNESS AND RAMP DEFLECTION ANGLE ON LAMINAR BOUNDARY-LAYER SEPARATION IN HYPERSONIC FLOW.
by J. C. Townsend. Feb 66, 26p NASA-TN-D-290

Descriptors: *Flow separation, *Hypersonic flow, *Laminar boundary layer separation, *Leading edge, *Two-dimensional flow.

N66-16924 **Field 1A**
CFSTI Prices: HC$4.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A FLAPPED TILT-WING FOUR-PROPELLER V/STOL TRANSPORT MODEL.
by K. W. Goodson. Feb 66, 110p NASA-TN-D-3217

Descriptors: *Vertical takeoff and landing/vtol/, *Aerodynamic characteristics, *Multiengine aircraft, Tilt-wing aircraft.

N66-16940 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
AN ESTIMATE OF THE CHEMICAL KINETICS BEHIND NORMAL SHOCK WAVES IN MIXTURES OF CARBON DIOXIDE AND NITROGEN FOR CONDITIONS TYPICAL OF MARS ENTRY.
by R. L. Mc Kenzie. Feb 66, 67p NASA-TN-D-3287

Descriptors: *Carbon dioxide, *Chemical kinetics, *Gas mixture, *Normal shock wave.

AD-634 865 **See Field 20D**

AD-634 872 **See Field 20D**

AD-635 125 **See Field 1B**

AD-635 468 **See Field 1C**

1B. AERONAUTICS

AD-635 031 **Field 1B**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Syracuse, N. Y. Electronics Lab.
DIGITAL CONTACT ANALOG.
Final rept., Jan 63-May 66,
by Edmund C. Wild. Jun 66, 32p
Contract Nonr-4057 (00)

Descriptors: (*Display systems, *Digital computers), (*Flight simulators, Display systems), Special purpose computers, Flight paths, Weapons systems, Armed forces research.

The objective of this work was to develop, design and provide an advanced laboratory version of a digitally implemented contact analog display system with the capacity to generate the following surfaces and symbols: a) A ground plane whose textured surface included a runway and a unique area that had a texture pattern distinct from that of the general ground texture. The ground plane was to consist of four nested patterns that were useful over an extended altitude range. b) A sky plane whose texture pattern was distinct from that of the ground plane and that would include a unique pattern to indicate the zenith. c) Terrain information encoded in the form of two rectangular parallelopipeds or obstacles that could be located at selected points on the ground plane. d) Three symbols located in the plane of the display; these symbols being: an airborne target symbol, a weapons symbol, and an impact point symbol. e) Two sets of four digit numbers located in the display plane. f) An earth-stabilized flight path that would respond to 360-degree rotation about all axes and that could be used as flight director, if so desired. The report describes the display content and the flexibility of the system. A brief discussion of the computer techniques employed to generate the display and a functional description of the system are included.

AD-635 125 **Field 1B, 1A**
CFSTI Prices: HC$1.50 MF$1.25
Sikorsky Aircraft Div., United- Aircraft Corp., Stratford, conn.
SINGLE ROTOR HELICOPTER DYNAMICS FOLLOWING POWER FAILURE AT HIGH SPEED.
Technical rept. (Final),
by Dean E. Cooper, Knute C. Hansen, and Thaddeus T. Kaplita. Jun 66, 261p SER-50414
Contract DA-44-177-AMC-195 (T)
Task 1D121401A14203
USAA-VLABS-TR-66-30

Descriptors: (*Helicopters, Dynamics), Helicopter rotors, Flight, Stability, Power, Malfunctions, Rotor blades (Rotary wings), Aviation safety, Design, Loading (Mechanics), Yaw.

The program was conducted to investigate the effects of a loss of power on a single rotor helicopter at high speeds. A normal mode flexible blade analysis was combined with generalized helicopter equations of motion on a hybrid computer to predict the effects of rotor design variables and corrective control inputs on the transient response of a helicopter following a loss of main rotor power. At high forward speeds (200 to 235 knots) a loss of power can seriously affect the safety of single rotor helicopters unless there is a rapid and appropriate application of main rotor and tail rotor control. Rotor propulsive force, hinge offset, and rotor blade inertia were found to be important design considerations which effect helicopter and blade motion and loading following a loss of power. The aircraft response is due primarily to the fuselage aerodynamic characteristics associated with the sideslip and yaw motion generated by the unbalanced tail rotor yawing moment. The loss of power is less critical when a partial loss of power occurs or for a reduced rotor propulsive force. (Author)

AD-634 985 **See Field 1D**

AD-635 030 **See Field 17I**

AD-635 122 **See Field 1D**

1C. AIRCRAFT

AD-634 943 **Field 1C, 21E**
CFSTI Prices: HC$10.60 MF$0.75
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X353-5B PROPULSION SYSTEM SPECIFICATION.
15 Jan 62, 108p Specification-112
Contract DA-44-177-TC-715
Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 944.

Descriptors: (*Vertical take-off planes, *Propulsion), Specifications, Ducted fans, Turbojet engines, Aircraft engines, Research planes, Military requirements.

Identifiers: V-5 Aircraft, X353-5B Engine.

This specification covers the characteristics of the X353-5B convertible V/STOL propulsion system intended for use in a piloted flight research airplane. The General Electric X353-5B Engine is a high lift-weight ratio convertible engine for turbojet operation and augmented lift operation. The basic X353-5B Engine comprises a turbojet engine modified for non-reheat operation, a tip-turbine lift fan augmenting turbojet thrust for V/STOL lift and propulsive thrusts, a gas diverter valve for selecting engine operating mode, and associated engine controls and accessories. The two part scroll on each lift fan permits incorporation of the X353-5B into an airplane powerplant configuration comprising two (2) basic X353-5B convertible engines pneumatically coupled such that each turbojet provides half of the required driving power for each of the lift fans. Rotors of the two lift fans rotate in opposite directions to minimize gyroscopic relations. All performance figures, weights, quantities, etc., in this specification are given for one X353-5B (one turbojet engine, one fan, one diverter valve) unless specifically stated otherwise.

AD-634 944 **Field 1C, 21E**
CFSTI Prices: HC$5.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X376 PITCH FAN SPECIFICATION.
Mar 62, 56p Specification-113
Contract DA-44-177-TC-715
Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 946.

Descriptors: (*Ducted fans, Flight control systems), (*Vertical take-off planes, *Flight control systems), Gas turbines, Specifications, Turbojet engines, Aircraft engines, Research planes, Pitch (Motion).

Identifiers: V-5 Aircraft, X376 Fan, X353-5B Engines.

This specification covers the characteristics of the X376 Pitch Fan intended for use in a piloted flight research airplane. The General Electric X376 Pitch Fan is a high liftweight ratio gas-driven lift fan for supplying augmented control and trim force in V/STOL systems. The X376 Pitch Fan comprises a single stage, tip-turbine driven lift fan supplied with turbojet exhaust gas bleed through two separate nozzle scrolls. The double scroll arrangement provides single-engine operating capability in a two-engine, cross-ducted lift propulsion system.

AD-634 945 **Field 1C, 21E**
CFSTI Prices: HC$2.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS RATING TEST.
1 Mar 62, 30p Specification-114
Contract DA-44-177-TC-715
Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 944.

Descriptors: (*Vertical take-off planes, *Propulsion), Flight testing, Specifications, Ducted fans, Turbojet engines, Aircraft engines, Research planes, Tests.

Identifiers: V-5 aircraft, X353-5B Engines.

This specification defines the flightworthiness rating test requirements for the X353-5B convertible, ducted lift fan propulsion system. The X353-5B propulsion system is comprised of a J85-GE-5 turbojet engine, less afterburner, used as a gas generator plus two additional major components: a diverter valve to direct the gas flow; and an X353-5B lift fan.

AD-634 946 **Field 1C, 21E**
CFSTI Prices: HC$2.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X376 PITCH FAN FLIGHTWORTHINESS RATING TEST.
Revised ed.
19 Apr 62, 30p Specification-115
Contract DA-44-177-TC-715
Revision of document submitted 25 Mar 62. Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 944/

Descriptors: (*Ducted fans, Flight control systems), (*Vertical take-off planes, *Flight control systems), Flight testing, Specifications, Gas turbines, Aircraft engines, Research planes, Pitch (Motion).

Identifiers: V-5 aircraft, X376 Fan.

This specification defines the flightworthiness rating test requirements for the X376, ducted, pitch trim control fan. The General Electric X376 pitch fan is designed for supplying augmented control and trim force in V/STOL systems. It is comprised of a single stage, tip-turbine driven fan supplied with turbojet exhaust gas bleed through two separated nozzle scrolls. The double scroll arrangement provides single-engine operating capability in a two-engine, cross-ducted lift propulsion system. (Author)

AD-634 947 **Field 1C, 21E**
CFSTI Prices: HC$2.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X353-5B PROPULSION SYSTEM ACCEPTANCE TEST.
Revised ed.
29 May 62, 28p Specification-116
Contract DA-44-177-TC-715
Revision of document submitted 15 Apr 62. Report on VZ-11 Lift Fan Flight Research Aricraft Program. See also AD-634, 945.

Descriptors: (*Vertical take-off planes, *Propulsion), Tests, Specifications, Ducted fans, Tubrojet engines, Aircraft engines, Research planes, Values, Acceptability.

Identifiers: V-5 aircraft, X-353-5B Engines.

This specification defines the acceptance test requirements for the lift fan and diverter value components of the X353-5B convertible, ducted, lift fan propulsion system conforming to Specification No. 112. (Author)

AD-634 948 **Field 1C, 21E**
CFSTI Prices: HC$2.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X376 PITCH FAN ACCEPTANCE TEST.
Revised ed.
28 May 62, 29p Specification-117
Contract DA-44-177-TC-715
Revision of document submitted 18 April 1962. Report on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 944.

Descriptors: (*Ducted fans, Flight control systems), (*Vertical take-off planes, *Flight control systems), Specifications, Acceptability, Tests, Turbojet engines, Aircraft engines, Research planes, Pitch (Motion).

Identifiers: V-5 aircraft, X376 Fan.

This specification defines the acceptance test requirements for the X376, ducted, pitch trim control fan conforming to Specification No. 113.

AD-634 949 **Field 1C, 21E**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Advanced Engine and Technology Dept.
PLAN FOR PERFORMANCE.
Oct 63, 23p Rept. no. 111-A
Contract DA-44-177-TC-715
Report on Lift Fan Flight Research Aircraft Program.

Descriptors: (*Vertical take-off planes, Performance (Engineering)), Research planes, Management planning.

Identifiers: V-5 aircraft.

For abstract, see T 66 16.

AD-634 950 **Field 1C, 21E**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Cincinnati, Ohio. Advanced Engine and Technology Dept.
X353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT (PENALTY TEST). VOLUME I. SUPPLEMENT I.
Oct 63, 72p
Contract DA-44-177-TC-715
Rept. on Lift Fan Flight Research Aircraft Program.

Descriptors: (*Propulsion, *Vertical take-off planes), Flight testing, Research planes, Turbojet engines, Convertible planes, Ducted fans.

Identifiers: V-5 aircraft, X 353-5B Engines.

The required 10-hour penalty test to evaluate design modifications to the X353-5B lift fan inlet vanes and aluminum exit louvers was completed in accordance with the schedule of test recommended to the Army in the X353-5B Propulsion System Flightworthiness Test Report. The test was completed on a slave X353-5B lift fan which was also an acceptance test vehicle. This report is a supplement to the X353-5B Propulsion System Flightworthiness Test Report and documents the penalty test and results. It is submitted to the U. S. Army (TRECOM) in accordance with Specification 114 to form the basis for establishing a flightworthiness rating for the complete propulsion system including lift fan inlet vanes, aluminum exit louvers and diverter valves. Upon completion of the test, the inspection results showed all lift fan components including inlet vanes and aluminum exit louvers to be in satisfactory condition. The new rotor assembly technique recommended in the FWT Report and described in FRV Specification 124 was completely successful in avoiding fretting. Partial disassembly of the rotor following the test, witnessed by an Army (TRECOM) representative, showed all of the rotor hardware to be in excellent condition. The XV-5A flight type diverter valve actuation successfully completed the penalty test plus two acceptance tests without incident and is in excellent condition.

AD-635 106 **Field 1C, 21E**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed-Georgia Co., Marietta.
XV-4A VTOL RESEARCH AIRCRAFT PROGRAM.
Summary rept., 30 Jun 61-30 Sep 65.
by Robert Nicholson, and Randall B. Lowry. May 66, 123p
Contracts DA-44-177-TC-773, DA-44-177-AMC-14 (T)
Proj. DA-1F131201D160
USAAVLABS-TR-66-45

Descriptors: (*Vertical take-off planes, *Thrust augmentation), Research planes, Flight testing, Jets, Ejection, Lift, Flight control systems, Feasibility studies, Exhaust gases, Propulsion.

Identifiers: V-4 aircraft.

A program was conducted to determine the feasibility of the augmented jet ejector concept for attaining a VTOL capability for aircraft. During the flight test program, the actual vertical thrust real-

ized was only about 93 percent of that predicted, and consequently the aircraft, the XV-4A, had a marginal lift capability. This marginal lift capability severely limited the capability to conduct quantitative data gathering during the flight test program. The report presents the limited quantitative results obtained and a brief summary of the aircraft design, systems, flight test program, VTOL lift improvement program, and small-scale and full-scale wind tunnel programs. The feasibility of the augmented jet ejector concept was demonstrated; however, this concept is not considered to be competitive with other concepts for attaining a VTOL capability. (Author)

AD-635 468 **Field 1C, 1A**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
SOME DESIGN PRINCIPLES OF GROUND EFFECT MACHINES SECTION B - AIR CUSHION MECHANICS.
Research and development rept.
by Harvey R. Chaplin, and Allen G. Ford. Apr 66, 38p Aero-1100B
Proj. SF013-0113
Task 11274
DTMB-2121B
See also AD-635 512.

Descriptors: (*Ground effect machines, Design), Aerodynamic configurations, Ground effect, Theory, Performance (Engineering), Lift, Jets, Gas flow, Fluid mechanics.

The energy and momentum relationships governing air cushion performance are reviewed. The exponential-theory equations are recommended for calculation of cushion pressure and jet reaction, and a modified equation is proposed for calculation of the volume flow rate. The question of off-design cushion performance is discussed. It is pointed out that off-design performance is of paramount practical importance and that the widely held notion that peripheral jet cushions are more efficient than simple plenum cushions is not necessarily valid in this context. The danger of drawing erroneous conclusions from the cushion performance equations, which (except for the plenum) do not apply to off-design operation, is emphasized. (Author)

AD-635 489 **Field 1C**
CFSTI Prices: HC$4.00 MF$0.75
General Electric Co., Cincinnati, Ohio. Advanced Technology and Demonstrator Programs Dept.
GROUND VIBRATION TEST RESULTS.
Apr 66, 107p Rept. no. 167
Contract DA-44-177-TC-715
Rept. on SV-5A Lift Van Flight Research Aircraft. See also AD-634 949.

Descriptors: (*Vertical take-off planes, Vibration), Tests, Research planes, Performance (Engineering), Captive tests, Resonance, Experimental data, Motion.

Identifiers: V-5 Aircraft.

This report contains the results of the experimental investigation of the static and dynamic characteristics of the U.S. Army XV-5A Lift Fan Research Aircraft as pertaining to the flutter and vibration effort on the XV-5A aircraft.

AD-635 512 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
SOME DESIGN PRINCIPLES OF GROUND EFFECT MACHINES. SECTION A. INTRODUCTORY SURVEY.
Research and development rept.
by Harvey A. Chaplin, and Allen G. Ford. Apr 66, 31p Aero-1100A
Proj. SF013-0113
Task 11274
DTMB-2121A
See AD-635 468.

Descriptors: (*Ground effect machines, Design), Ground effect, Reviews, Jets, Ducted fans, Fluid mechanics.

Ground effect machine types and principles are reviewed, and development trends are examined. The 'Hovercraft' and 'Captured Air Bubble' types are chosen for detailed study in the succeeding reports of this Series. (Author)

PB-170 345 **Field 1C, 13I, 5C**
CFSTI Prices: HC$4.00 MF$1.00
Adams (T. F. M.) and Co., Ltd., Tokyo (Japan).
THE MARKET FOR AIRCRAFT MAINTENANCE EQUIPMENT IN JAPAN. PART I.
15 Sep 65, 137p
Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C. Prepared for presentation at Equipment for Aviation Industry Exhibition, Tokyo, September 19-27, 1966. See also PB-170 346

Descriptors: (*Aircraft, Maintenance equipment), (*Maintenance equipment, Aircraft), (*Japan, Commerce), Industrial equipment, Small tools, Tool kits, Snow vehicles, Gliders, Automatic pilots, Civil aviation, United States.

Conclusions: An exhibition of aircraft maintenance equipment should center on newly developed equipment and US products superior to the corresponding Japanese makes. They should include various precision tools, newly developed testers and gauges, and auto pilot systems for small civil aircraft, together with advanced lorries, sweepers and heavy snow plows. Besides these items, multi-purpose compact tools, maintenance tool kits, (now under production in Europe), tool kits for gliders, and aviation equipment related to the ESTOL capacity of small aircraft should be exhibited. (Author)

AD-634 845 **See Field 10C**

AD-634 951 **See Field 11C**

AD-634 980 **See Field 14D**

AD-635 027 **See Field 13H**

PB-170 346 **See Field 17B**

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

AD-470 761 **Field 1D**
CFSTI Prices: HC$3.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
BIRD IMPACT TESTS OF VULCAN AIRCRAFT WINDSCREENS.
by I. I. McNaughtan, and D. A. Perfect. Jul 65, 32p Technical rept. TR-65148

Descriptors: (*Jet bombers, Windshields), (*Windshields, Shock resistance), Birds, Impact shock, Laminated glass, Sandwich construction, Metal films, Gold, Model tests, Great Britain.

Identifiers: Bird impact hazards, Vulcan aircraft.

A description is given and results are presented and discussed of a series of tests made to evaluate the bird impact resistance of Vulcan windscreens. The investigation included both dry air sandwich and gold film type panels impacted with 1 lb. 2 1/2 lb and 4 lb birds. (Author)

AD-634 985 **Field 1D, 1B, 5I**
CFSTI Prices: HC$2.00 MF$0.50
Bell Helicopter Co., Fort Worth, Tex.
CONTACT ANALOG SIMULATOR EVALUATIONS: UNUSUAL ATTITUDE MANEUVERS.
Technical rept.
by Carl Koch, and Dora J. Dougherty. Dec 65, 33p
Contract Nonr-1670 (00)
JANAIR-TR-D228-421-504

Descriptors: (*Flight simulators, Analog systems), (*Pilots, Performance tests), Flight, Attitude control systems, Helicopters, Maneuverability, Flight paths, Display systems, Analysis.

Identifiers: JANAIR project, Evaluation.

The study was performed to determine the pilot's ability to recover from unusual attitude and to handle emergency maneuvers using the contact analog display. Five recoveries from unusual attitudes and two autorotation maneuvers were investigated. Four subjects performed each maneuver under two experimental conditions. Two display conditions were tested to determine the pilot's ability to reorient himself following the maneuver. One display condition employed the contact analog with the pathway and the other display condition employed same without the pathway. Performance measures included heading, pitch, yaw and impact G. Analysis of the findings indicates that (1) the pictorial qualities of the contact analog permit easy and positive recovery from unusual and emergency maneuvers; (2) the pathway had no significant effect on the pilot's ability to recover; (3) the pathway permitted reorientation with the original flight path; and (4) any disorientation effects of unusual maneuvers with respect to attitudes seem to be eliminated with the contact analog display. (Author)

AD-635 066 **Field 1D**
CFSTI Prices: HC$3.00 MF$0.75
Lear Siegler Service, Inc., Harrisburg, Pa.
ZERO-GRAVITY MANEUVER INSTRUMENTS AND INSTRUMENTATION.
Final rept. Apr 64-Apr 65.
by B. C. Dixon. Feb 66, 60p
Contract AF 33 (657)-11107
Proj. AF-7184
Task 718405
AMRLTR-66-1

Descriptors: (*Attitude indicators, *Flight instruments), Maneuverability, Weightlessness, Display systems, Accelerometers.

The type ARU-2B/A Attitude Director Indicator (ADI) system was evaluated as a pilot aid in flying a JC-131B aircraft on a ballistic trajectory to produce a zero- or reduced-gravity field. To provide an unburdened display to the pilot, all information necessary to fly a complete zero-G maneuver was presented on the ADI, except airspeed. A Parabola Control Panel was designed to provide six modes of presenting normal acceleration data to the ADI; i.e., zero-G, sub-G, super-G, decay, float, and program modes. The modes were effective, except for the float and program modes which are still experimental. Data from 385 maneuvers at various gravity levels from 0 G to 0.75 G revealed that when flying gravity levels below 0.25G an accuracy of plus or minus0.05G could be maintained. This is generally considered an acceptable parabola. However, when flying gravity levels greater than 0.25G the errors became greater than ;0.05G. As the desired gravity level is increased, the parabola time is increased and a high degree of accuracy is more difficult to maintain. In addition, the system errors were greater at the higher gravity levels. These two facts account for most of the errors at increased sub-gravity levels. The ARU-2B ADI system proved to be an effective aid in flying various sub-G, super-G, zero-G, and decay maneuvers. (Author)

AD-635 122 **Field 1D, 1B**
CFSTI Prices: HC$1.60 MF$0.50
Naval Air Test Center, Patuxent River, Md.

EFFECTS OF PILOT TECHNIQUE ON MINIMUM APPROACH SPEED.
Final rept.
by A. F. Bezanson. 17 Feb 61, 13p Rept. nos. 1, FT2222-56
Proj. TED-PTR-AD-3089

Descriptors: (*Throttling, Approach), (*Control sticks, Approach), (*Approach, Airspeed), (*Pilots, Performance (Human)), Fighters, Maneuverability, Thrust, Stability.

Identifiers: F-6 aircraft, F-8 aircraft.

The report consists of comments on the role of the stick and throttle in making altitude changes on the glide slope and characteristics which affect the selection of optimum approach speed with special emphasis on the F8U-1 and F4D-1 airplanes. It is concluded that the primary factors in establishing the role of the stick and throttle in obtaining vertical maneuvering capability (ability to make altitude corrections) on the glide slope are: the shape of the thrust required curve at the optimum approach airspeed; effectiveness of longitudinal control in making altitude corrections at the optimum approach airspeed and effectiveness of throttle adjustment in making altitude corrections at the optimum approach airspeed. Where the optimum approach airspeed is determined by vertical maneuvering capability, the combination of longitudinal control and throttle adjustments necessary to produce the optimum maneuvering capability must be used. (Author)

AD-635 485 See Field 17I

1E. AIR FACILITIES

PB-169 548 See Field 17H

PB-170 313 See Field 5C

2A. AGRICULTURAL CHEMISTRY

N66-16381 **Field 2A**
CFSTI Prices: HC$1.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE DYNAMICS OF THE AURORA. PART VII. EQUATORWARD MOTIONS AND THE MULTIPLICITY OF AURORAL ARCS.
by S. I. Akasofv, D. S. Kimbal, and C. I. Meng.
Dec 65, 25p
Grants NsG-201-62, NsG-233-62
NASA-CR-69874
Prepared in cooperation with National Science Foundation Grant NSF-GP-2721.

Descriptors: *Auroral emission, *Dynamic property, *Motion perception, *Aurora 7.

For abstract, see T 66 16.

2F. FORESTRY

PB-170 354 See Field 11L

PB-170 356 See Field 11L

PB-170 358 See Field 11L

PB-170 359 See Field 11L

3A. ASTRONOMY

AD-634 941 **Field 3A, 3C**
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
RELATIVE ORIENTATION OF THE EARTH'S EQUATOR AND THE LUNAR ORBIT IN THE DISTANT PAST.
by N. A. Sorokin. 5 May 66, 13p RSIC-546
TT-66-61650
Trans. of Astronomicheskii Zhurnal (USSR) v42 p1070-4 1965.

Descriptors: (*Celestial mechanics, *Astronomical data), Moon, Earth, Rotation, Numerical analysis, USSR.

The variations of the moon-earth distance and the inclination angle of the earth's axis to the plane of the lunar orbit during the tidal evolution of the earth-moon system are discussed. At 'closest approach' the moon was at a distance of 2.4 earth radii. The inclination angle of the earth's axis with the normal to the moon's orbit increased with time. Its minimal value was 12 degrees for the moon-earth distance of 4 earth radii. At 'closest approach' it was 13 degrees. (Author)

AD-635 263 **Field 3A**
CFSTI Prices: HC$1.50 MF$0.75
Utah State Univ., Logan. Electro-Dynamics Labs.
A CONTINUOUSLY VARIABLE DOUBLE SLIT SYSTEM AND THE FOURIER ANALYSIS OF MICHELSON'S STELLAR INTERFEROMETER.
by Royce H. Allen. 1 May 66, 70p Scientific-5
Contract AF 19 (628)-3825, ARPA Order-450
Proj. AF-8663
AFCRL-66-399

Descriptors: (*Fourier analysis, *Interferometers), Experimental data, Diffraction gratings, Astronomy, Instrumentation.

An experimental investigation was made to develop a procedure whereby the Michelson stellar interferometer could be used to space analyze an unknown quasi-monochromatic source function under Fraunhofer conditions. A continuously variable double slit system is described in detail which separates a pair of infinite parallel slits in a uniform bilateral fashion. The techniques involved in the retrieval of information from the interference pattern of the interferometer are shown to be: (a) place a fixed detector in the region of the first order of the diffraction curve, (b) allow the double slits in the interferometer to separate at a uniform rate, (c) obtain the visibility curve by determining the envelope of the intensity versus slit separation distance curve from the previous step, and (d) Fourier transform the visibility curve to obtain the source function. (Author)

N66-15382 **Field 3A**
CFSTI Prices: HC$2.00 MF$0.50
Florida Univ., Gainesville. Dept. of Physics and Astronomy.
DEVELOPMENT OF AN ORBITAL RECEIVER FOR LOW-FREQUENCY RADIO ENERGY FROM THE PLANET JUPITER.
Final rept. 1 Jun 64-30 Sep 65. 1965. 47p
Contract NASr-176
NASA-CR-69340

Descriptors: *Detection, *Radio energy, *Jupiter (Planet).

For abstract, see T 66 16.

PB-169 852 **Field 3A**
CFSTI Prices: HC$3.60 MF$0.50
Pennsylvania State Univ., University Park. Radio Astronomy Observatory.
SOLAR RADIO FLUX DURING THE IQSY AT UNIVERSITY PARK, PENNA. JULY-AUGUST-SEPTEMBER, 1965,
by John P. Hagen. Mar 66, 33p Scientific rept. no. 003
Grant NSF-GP-2986

Descriptors: (*Solar radiation, Measurement), (*Astronomical data, Pennsylvania), Radio astronomy.

Identifiers: International Years of the Quiet Sun.

This report contains solar radio flux data recorded at 10,700 Mc/s, 2,700 Mc/s and 328 Mc/s during the quarter 1 July 1965 to 30 September 1965. A table of distinct events is also given. (Author)

3B. ASTROPHYSICS

AD-450 431 **Field 3B, 9E**
CFSTI Price: HC$1.50
Stanford Univ., Calif. Stanford Electronics Labs.
AN ANTENNA ARRAY FOR RADAR ASTRONOMY STUDIES IN THE 20 TO 55 Mc RANGE.
Technical repts.
by H. T. Howard. 15 Aug 64, 27p SU-SEL-64-104, TR-8
Contract AF19 (604)-7436
Proj. AF-5629
Task 562901
AFCRL-65-70
Supported in part by NASA, Contract NsG-377, TR-3.

Descriptors: (*Radio astronomy, Antenna arrays), (*Antenna arrays, Radio astronomy), (*Radar antennas, Radio astronomy), High frequency, Very high frequency, Radar signals, Propagation, Astrophysics.

The discipline of radar astronomy requires antennas capable of handling large peak and average powers over a wide frequency range, while providing both high directive gain and enough steerability to illuminate targets for extended periods of time. This report discusses the design and construction of a branch-fed, variable-phase, 20-60 mc array of 48 log-periodic elements. Phasing to control beam direction is described and the correction necessary for ionospheric refraction is presented in terms of vertical incidence critical frequency. The array gain as measured by moon bounce techniques is found to be in good agreement with the theoretical value. (Author)

AD-634 918 **Field 3B, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Liege Univ. (Belgium). Dept. of Astrophysics.
RESEARCH ON RELATIONS BETWEEN COMETARY, SOLAR AND UPPER ATMOSPHERIC PROCESSES.
Annual summary rept. no. 4, 1 Apr 65-31 Mar 66,
by Pol Swings. 25 Apr 66, 34p
Contract AF 61 (052)-587
Proj. AF-7661
Task 766101
AFCRL-66-433

Descriptors: (*Astrophysics, Spectroscopy), (*Molecular spectroscopy, Astrophysics), (*Ultraviolet spectroscopy, Astrophysics), (*Comets, Spectroscopy), Aurorae, Stars, Space environmental conditions, Photomultipliers.

Laboratory work has been carried on: the time resolution of spectra; the spectra of several molecules of astronomical interest; various instruments; the study of photomultipliers. The physical mechanisms in comets have been further discussed. Other programs of cometary and solar investigations have been started. Investigations related to space experiments are mainly concerned with the far ultraviolet spectra of stars, comets and aurorae, and with artificial comets. (Author)

AD-635 284 **Field 3B**
CFSTI Prices: HC$4.00 MF$0.75
RAND Corp., Santa Monica, Calif.
REDUCTION OF THE EQUATIONS OF RADIATIVE TRANSFER FOR A PLANE-PARALLEL, PLANETARY ATMOSPHERE: PART I.
by Zdenek Sekera. Jun 66, 84p RM-4951-PR
Contract AF 49 (638)-1700

Descriptors: (*Planetary atmospheres, *Transport properties), Rayleigh scattering, Matrix algebra, Integral equations, Differential equations.

Identifiers: Radiative transfer.

A discussion is presented of the reduction of the equations of radiative transfer when the phase matrix is 'separable.' A separable matrix is one that can be expressed as the product of two matrices, one whose elements depend on the directional parameters of the incident beam alone, and the other whose elements depend on the directional parameters of the scattered beam alone. When the phase matrix can be developed as a harmonic series in the azimuth difference between the vertical planes containing the scattered and incident beams and each term of this series is separable, the radiative transfer equations have 'series' solutions with each term in these series being given by a product of three matrices; one of these is azimuth-independent, the other two, which post- and pre-multiply this matrix, are the same matrices whose product forms the corresponding term in the phase matrix. (Author)

AD-635 504 **Field 3B, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Liege Univ., Cointe-Sclessin (Belgium). Institute d'Astrophysique.
HYPERFINE STRUCTURE OF Mn I LINES IN THE SOLAR SPECTRUM. PHOSPHORUS LINES IN THE SOLAR SPECTRUM.
Technical notes.
by J. W. Swensson. 30 Apr 66, 33p TN-3-4
Contract AF 61 (052)-685
AFCRL-66-453

Descriptors: (*Manganese, Solar spectrum), (*Phosphorus, Solar spectrum), (*Solar spectrum, Chemical analysis), Line spectrum, Hyperfine structure, Astrophysics.

On high-resolution photometric tracings of the solar spectrum taken by L. Delbouille and G. Roland certain Mn I lines near lambda 8700, belonging to the multiplet y (6)P (o) - e (6)D, have wide, complex profiles that are attributed to hyperfine structure. Structures at lambda lambda 8741, 8704 and 8701 A are analysed. The earlier identifications of P I lines by Babcock and Moore are confirmed. An abridged multiplet table giving laboratory and solar data lists 26 lines due to neutral phosphorus, including some blends, in the infrared region of the Fraunhofer spectrum. Eighteen of the P I assignments are new: of these, four are subject to some doubt. Six of the new identifications are based on prediction. (Author)

AD-635 525 **Field 3B, 20H**
CFSTI Prices: HC$4.00 MF$0.75
RIAS, Inc., Baltimore, Md.
THE STUDY AND INVESTIGATION OF NEUTRONS PRESENT ABOVE THE ATMOSPHERE IN NEAR-EARTH SPACE.
Final rept. 1 Jun 63-31 Jan 66.
by J. P. Martin, and J. B. Mead. Mar 66, 77p
Contract AF 19 (628)-3253
Proj. AF-8600
AFCRL-66-206

Descriptors: (*Cosmic rays, *Neutrons), Albedo, Scientific satellites, Polar orbit trajectories, Cosmic ray telescopes, Scintillation counters, Balloons, Resolution, Neutron detectors, Ionization chambers.

The density of neutrons above the atmosphere was measured by a pair of BF3 proportional counter systems aboard a polar orbiting satellite. The shape of the latitude variation of the measured density (10:1 between poles and equator) was consistent with theoretical predictions, but the measured absolute values were about three times higher. Since neutrons in the vicinity of earth are produced by cosmic ray interactions, instrumentation was developed to measure the poorly known heavy element component of the cosmic radiation. A large area scintillator-Cerenkov telescope with a geometric factor of 176 sq cm stearadian was developed in prototype for measurements from high altitude baloons. The principal difficulty in developing a telescope with large aperture (necessary for good counting statistics) is maintaining good pulse height resolution. This was solved for the Cerenkov detector with a technique of optical trimming of the photomultiplier cathods. A number of detection schemes for high energy neutrons were investigated including a proton recoil detector, a C12-3 alpha detector, and bismuth fission detectors. The conclusion of this study is that a compact multiplate fission ionization chamber would be more practical than a bismuth loaded liquid scintillator.

N66-15236 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE ORIGIN OF THE MOON.
by P. D. Lowman Jr. 1964, 16p NASA-TM-X-56134

Descriptors: *Geophysics, *Lunar geology, *Earth-moon system, *Origin.

For abstract, see T 66 16.

N66-15237 **Field 3B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ON THE THEORY OF EVOLUTION OF COMPLETELY MIXED STARS WITH MASS LOSS.
by R. Stothers. 1965, 23p NASA-TM-X-56075

Descriptors: *Luminosity, *Star cluster, *Stellar evolution.

N66-15322 **Field 3B**
CFSTI Prices: HC$3.00 MF$0.50
California Inst. of Tech., Pasadena.
EVOLUATION II. FROM THE MAIN SEQUENCY THROUGH CORE HELIUM BURNING, M EQUALS 3 M SUN MASSES.
by I. Iben Jr. 1964, 51p
Contract Nonr-220 (47), Grant NGR-05-002-028
NASA-CR-60828

Descriptors: *Giant star, *Main sequence star, *Stellar evolution.

N66-15338 **Field 3B**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRANSLATIONAL AND ROTATIONAL MOTION OF A BODY ENTERING THE MARS ATMOSPHERE.
by P. H. Feitis. 1 Dec 65, 47p JPL-TR-32-845
Contract NAS7-100
NASA-CR-69252
Presented at the Joint Ann. Meeting of the WGLR-DGRR, Berlin, Sep 16 1964.

Descriptors: *Atmospheric entry, *Sphere, *Translational motion, *Mars atmosphere, *Motion equation, *Reentry physics.

N66-15371 **Field 3B**
CFSTI Prices: HC$5.00 MF$1.00
Little (Arthur D.), Inc., Cambridge, Mass. Research and Development Div.
THE EFFECT OF THE LUNAR ENVIRONMENT OF MAGMA GENERATION, MIGRATION, AND CRYSTALLIZATION, AUGUST 13, 1964 - AUGUST 20, 1965.
by R. V. Allen, J. Aronson, G. Feick, D. W. Lee, and L. McClaine. 1 Nov 65, 164p
Contract NAS9-3449
NASA-CR-65186

Descriptors: *Moon, Petrology, *Petrology, moon.

N66-16549 **Field 3B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
THEORETICAL RELATIONSHIPS FOR METEOROID PUNCTURE EXPERIMENTS.
by C. C. Dalton. Feb 66, 31p NASA-TN-D-3244

Descriptors: *Celestial body, *Meteorite collision, *Satellite measurement.

PB-170 815 **Field 3B**
CFSTI Price: MF$0.50
Pennsylvania State Univ., University Park. Radio Astronomy Observatory.
SOLAR RADIO FLUX DURING THE IQSY AT UNIVERSITY PARK, PENNSYLVANIA OCTOBER-NOVEMBER-DECEMBER 1965.
Scientific rept. no. 004, 1 Oct-31 Dec 65.
by John P. Hagen. May 66, 32p
Grant NSF-GP-2986
See also PB-169 852.

Descriptors: (*Solar radiation, Pennsylvania), Radiometers, Astronomical data.

Identifiers: International Years of the Quiet Sun.

This report contains solar radio flux data recorded at 10,700 Mc/s, 2,700 Mc/s and 328 Mc/s during the quarter 1 October 1965 to 31 December 1965. A table of distinct events is also given. (Author)

AD-634 824 **See Field 4A**

AD-634 984 **See Field 3C**

AD-634 990 **See Field 3C**

AD-635 204 **See Field 6R**

AD-635 266 **See Field 4A**

AD-635 373 **See Field 7D**

3C. CELESTIAL MECHANICS

AD-634 984 **Field 3C, 3B**
CFSTI Prices: HC$1.00 MF$0.50
Texas Univ., Austin.
GALAXY RED-SHIFTS BY PHOTOELECTRIC SPECTROPHOTOMETRY.
Technical rept.
by G. de Vaucouleurs. Jul 66, 23p TR-2
Contract N00014-66-C0061
Rept. on Spectroscopic and Radial Velocity Survey of Bright Galaxies.

Descriptors: (*Galaxies, Doppler effect), (*Doppler effect, *Celestial mechanics), Electromagnetic waves, Phase shift, Spectroscopy, Astronomical data.

Identifiers: Redshift.

Preliminary report on experiments to replace the classical photographic technique by photoelectric spectrophotometry in measuring radial velocities of galaxies. Examples of velocities measured in 1965 with a medium-dispersion spectrum scanner attached to the 82-inch reflector of McDonald Observatory are discussed. (Author)

AD-634 990 **Field 3C, 3B, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Texas Univ., Austin. Dept. of Astronomy.
RADIAL VELOCITIES OF EXTENDED SOURCES BY A SLITLESS SCANNING TECHNIQUE.
Technical rept.
by G. de Vaucouleurs. Jul 66, 23p TR-3
Contract N00014-66-C0061
Proj. NR-046-785
Report on Spectroscopic and Radial Velocity Survey of Bright Galaxies.

Descriptors: (*Celestial mechanics, *Spectrophotometers), (*Doppler effect, Spectrophotometers), Astrophysics, Spectroscopy, Instrumentation.

Identifiers: Redshift.

Description and tests of a double-beam pulse counting spectrophotometer using a tunable interference filter to measure radial velocities of extended astronomical sources. Preliminary report of observations of stars, globular clusters, planetary nebulae and galaxies made in March and May 1966 with the 36-inch reflector of Mcdonald Observatory. (Author)

N66-17044 **Field 3C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
COMPUTATION OF GENERAL PLANETARY PERTURBATIONS. PART III. AN EXPANSION OF THE DISTURBING FORCE.
by L. Carpenter. Feb 66, 23p NASA-TN-D-3078

Descriptors: *Elliptical orbit, *Orbital motion, *Perturbation theory, *Planetary orbit.

For abstract, see T 66 16.

AD-634 941 **See Field 3A**

4A. ATMOSPHERIC PHYSICS

AD-437 796 **Field 4A, 7D**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
APPROXIMATE RADIATION PROPERTIES OF AIR BETWEEN 2000 AND 8000K.
by F. R. Gilmore. Mar 64, 30p RM-3997-ARPA

Descriptors: (*Air, Electromagnetic waves), (*Band spectrum, Air), Absorption spectrum, Molecular spectroscopy, High-temperature research, Atmosphere entry, Continuous spectrum, Nitrogen compounds, Oxides, Emissivity, Light, Chemoluminescence.

Identifiers: Nitrogen oxides.

The spectral absorption coefficient for equilibrium air at five temperatures between 2000 and 8000K and six densities between 10 and 0.0001 times the standard density was calculated by correcting the 1959 tables of Meyerott, Sokolov, and Nicholls for revised values of the f-numbers of the molecular band systems, and adding the contributions of several band systems and continua not included by those investigators. The analysis indicates that band systems of NO2 make an important contribution to the absorption coefficient of air below 6000K, and the uncertainty in this contribution is probably the biggest source of uncertainty in the air results. Tables of the spectral absorption coefficient, the Planck mean absorption coefficient, the spectral emission coefficient, the total emission rate, and the visible emission rate are included. (Author)

AD-441 139 **Field 4A, 7D, 22C**
CFSTI Price: HC$6.60
RAND Corp., Santa Monica, Calif.
AIR RADIATION FROM NONEQUILIBRIUM WAKES OF BLUNT HYPERSONIC REENTRY VEHICLES.
by R. O. Hundley. Jun 64, 70p RM-4071-ARPA
Contract SD-79, ARPA Order-189-61
N64-22616

Descriptors: (*Atmosphere entry, Electromagnetic waves), (*Air, Excitation), (*Reentry vehicles, Wake), Reaction kinetics, Ultraviolet radiation, Infrared radiation, Light, Chemiluminescence, Nitrogen, Nitrogen compounds, Oxides, Turbulence, Convection, Hypersonic flow.

Identifiers: Afterglow, Nitrogen oxides.

The wakes of reentry vehicles at altitudes of 100,000 ft or above will not be in chemical equilibrium. In this nonequilibrium regime the radiation (UV, visible, and near IR) will be produced primarily by various chemiluminescent reactions. For the case of a pure air wake the most important of these will be the Lewis-Rayleigh nitrogen afterglow, the blue nitric oxide afterflow, and the NO2 'continuum.' Two recently proposed models of the turbulent mixing process are considered: the inviscid random convection model, and the homogeneous mixing model. These two models give radiant intensities for the various chemiluminescent reactions that differ as much as several orders of magnitude. The radiation estimates presented show that the nonequilibrium wake radiation in the UV, visible, and near IR should dominate the gas cap and surface radiation at altitudes above about 100,000 ft.

AD-634 785 **Field 4A, 22C, 9B**
CFSTI Prices: HC$2.00 MF$0.50
International Business Machines Corp., Cambridge, Mass. Cambridge Space Systems Dept.
ATMOSPHERIC DENSITY DETERMINATION VIA NUMERICAL INTEGRATION AND DIFFERENTIAL ORBIT CORRECTION.
Interim scientific rept., Mar 65-Mar 66,
by Arnold S. Bramson. Apr 66, 44p Scientific-2
Contract AF 19 (628)-4192
Proj. AF-6690
Task 669005
AFCRL-66-332

Descriptors: (*Atmospheric sounding, Density), Drag, Satellites (Artificial), Satellite tracking systems, Orbital trajectories, Integration, Differential equations, Programming (Computers), Atmosphere models, Upper atmosphere.

Atmospheric density determination may be carried out by a careful reduction of satellite observations over long periods of time. The particular approach being reported upon consists of a numerical integration procedure combined with a differential correction scheme where discrepancies between computed and observed satellite position and velocity are reconciled by adjusting the assumed atmospheric model, thereby yielding corrected or refined density data. An important advantage of this technique is its applicability to satellites entering the decay stage where the effects of atmospheric drag are considerable and where a relatively short time span of observations may be available. This report describes a computer program which is capable of computing atmospheric densities. Emphasis is placed on the actual use of the program, with a complete user's manual being included. Preliminary numerical results obtained from the program are presented and limitations of the method are discussed. (Author)

AD-634 812 **Field 4A, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
EXPERIMENTAL OBSERVATION OF FLUCTUATIONS OF THE TEMPERATURE OF ATMOSPHERIC RADIO EMISSION.
by V. P. Lastochkin, and K. S. Stankevich. 20 Jan 66, 7p FTD-TT-65-1468
TT-66-61586
Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Radiofizika (USSR) v7 n4 p789-90 1964.

Descriptors: (*Atmospherics, Thermal properties), (*Radio waves, Atmospherics), Atmospheric motion, Atmospheric temperature, Oscillation, Meteorological phenomena, Measurement, Radiometers, USSR.

For abstract, see T 66 16.

AD-634 824 **Field 4A, 3B**
CFSTI Prices: HC$6.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass. Space Physics Lab.
GEOPHYSICS AND SPACE DATA BULLETIN. VOLUME II. NUMBER 4.
Quarterly rept. no. 4, 1965.
by Anne L. Carrigan, and Norman J. Oliver. 1965. 295p

Descriptors: (*Geophysics, Periodicals), (*Space environmental conditions, Periodicals), Magnetometers, Cosmic rays, Neutrons, Intensity, Monitors, Backscattering, Radar, High frequency, Electromagnetic waves, Propagation, Radio astronomy, Atmospheric sounding.

Contents: Total field intensity magnetometer; Cosmic ray neutron intensity monitor; Oblique backscatter radar; Oblique high-frequency propagation; Riometer; Solar optical patrol observations; Solar radio emission; Vertical incidence ionospheric soundings.

AD-634 830 **Field 4A, 18C**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ABSORPTION MEASUREMENTS AT MORNING TWILIGHT.
by C. M. Crain. Jun 66, 15p P-3397
Presented at the DASA Symposium on the Physics and Chemistry of the Lower Atmosphere, Boulder, Colorado, June 28-29, 1966.

Descriptors: (*Photochemistry, *Atmosphere), (*Airburst, Photochemistry), Nuclear explosions, Explosion effects, Optics, Twilight, Absorption.

This paper describes the variation of absorption produced by nuclear air bursts during the transition period from night to day. For air bursts occurring some 15 to 30 minutes before sunrise at 100 km, the transition absorption characteristics are found to have the following consistent features: (1) absorption increases from the nighttime value when the solar zenith angle reaches about 100 degrees; and (2) the transition from night to day occurs over a time period some 30 minutes longer than that calculated by a lumped parameter solution of the rate equations using only 02 (-) negative ions and photodetachment. Data from three very similar bursts which occurred when the solar zenith angles were 96, 90, and 81 degrees are compared and are found to indicate the following characteristics: (1) the peak absorption reached at about 5 minutes following each of these similar bursts increased progressively with a decrease in the zenith angle at burst time; (2) the transient behavior for the 81-degree case was of a pure daytime nature, while the 90- and 96-degree cases indicated a night-day transition behavior, with the 96-degree case more marked in this regard. This feature is consistent with the results for the bursts occurring shortly before sunrise. (Author)

AD-634 841 **Field 4A, 8N**
CFSTI Prices: HC$1.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
IONOSPHERIC VARIATIONS OVER WASHINGTON, D. C., BEFORE AND AFTER GEOMAGNETIC STORMS.
Research and development rept., Jun 63-Jan 66,
by V. R. Noonkester. 25 Mar 66, 20p NEL-1367
Proj. SR-011-01-01
Task 0401

Descriptors: (*Ionospheric disturbances, *Magnetic storms), Sunspots, Meteorological phenomena, Terrestrial magnetism, Atmospheric sounding, District of Columbia.

Identifiers: E-region, F-region.

Midday averages of the critical frequencies of ordinary waves of the F2- and E-regions, F sub o F2 and f sub o E, and the minimum virtual height of the E-region, hE, were computed from hourly values to represent the E and F regions at Washington, D. C. Long-term variations were removed

by mathematical filtering. Superposed epoch analysis of the filtered averages revealed that: (1) h and fE are not related to magnetic storms, (2) except during sunspot minimum, fF is large 1 or 2 days before magnetic storms and small up to 3 days afterwards, (3) during sunspot minimum fF is not related to magnetic storms. (Author)

AD-634 884 **Field 4A, 4B**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
OBSERVED DIURNAL OSCILLATIONS OF PRESSURE AND DENSITY IN THE UPPER STRATOSPHERE AND LOWER MESOSPHERE,
by Otto W. Thiele. Apr 66, 28p
Task 1V650212A127-03
ECOM-5047

Descriptors: (*Upper atmosphere, Diurnal variations), (*Atmospheric sounding, Diurnal variations), Stratosphere, Barometric pressure, Density, Measurement, Sounding rockets, New Mexico.

Identifiers: Mesosphere.

Two recent series of meteorological rocket measurements in the upper stratosphere and lower mesosphere conducted in the summer and fall of 1965 at White Sands Missile Range, New Mexico, indicate a significant diurnal oscillation of pressure and density in this region. The amplitude of observed pressure oscillations over an averaged layer from 52 to 58 km varied from 4 to 7 percent with a mean value of 5 percent while the amplitude of density averaged through the same layer varied from 3 to 5 percent with a mean of 3.5 percent. Harmonic analyses of the heights of the 1.0, 0.6 and 0.4 mb surfaces indicate maxima at approximately 1400 and 1200 hours (local time) for the summer and fall series, respectively. In the vicinity of 55 km the total range of the diurnal oscillations of pressure and density as evidenced by these data was found to be almost as large as the seasonal variability. (Author)

AD-634 907 **Field 4A, 13B, 4B**
CFSTI Prices: HC$3.00 MF$0.75
Frankfurt Univ. (West Germany). Institut fuer Meteorologie und Geophysik.
ATMOSPHERIC AEROSOL- AND TRACE-GAS-WASHOUT.
Final scientific rept.
by Hans-Walter Georgii, and Siegfried Beilke.
Mar 66, 59p
Contract AF 61 (052)-815
AFCRL-66-389

Descriptors: (*Aerosols, Air pollution), (*Air pollution, Rainfall), (*Sulfur compounds, Air pollution), Dioxides, Gases, Absorption, Raindrops, Fogs, West Germany.

Identifiers: Sulfur dioxide, Washout, Rainout.

This report summarizes the results of detailed investigations in the laboratory on washout and rainout of SO2 by droplets of known size distribution and concentration. The results show clearly the effect of drop size, intensity and of the chemical composition (pH-value) of rain and fog on the scavenging efficiency. The results of the experiments were used as basis of a model calculation of the effect of washout and rainout by natural precipitation at a given vertical distribution of SO2. The report demonstrated under which circumstances the rainout, respectively washout mechanism becomes predominant for the chemical composition of rainwater at the ground. (Author)

AD-634 910 **Field 4A, 22B, 20N**
CFSTI Prices: HC$3.00 MF$0.50
National Committee for Space Research, Haifa (Israel). Radio Observatory.
IONOSPHERIC RESEARCH USING SATELLITES.
Annual summary rept. no. 1, Nov 64-Jun 65.
by Jonathan Mass. 29 Dec 65, 53p
Contract AF 61 (052)-837
AFCRL-66-383

Descriptors: (*Atmospheric sounding, *Satellites (Artificial)), (*Ionosphere, Atmospheric sounding), Radio transmission, Magneto-optic effect, Electron density, Radio equipment.

The satellite receiving station is described. The methods used for determining the ionospheric total electron content and its horizontal gradient are discussed and results for the period Nov. 1964 - June 1965 are presented. Research done on the Faraday fading rate at nearly transversal propagation is reported. (Author)

AD-634 953 **Field 4A, 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Observatory of Athens (Greece). Ionospheric Inst.
IONOSPHERIC RESEARCH USING SATELLITES.
Annual rept. no. 2, 1 Jan 65-28 Feb 66,
by Michael Anastassiadis. 28 Feb 66, 28p
Contract AF 61 (052)-754
AFCRL-66-388

Descriptors: (*Atmospheric sounding, *Ionosphere), Scientific satellites, Radio transmission, Very high frequency, Ionospheric disturbances, Electron density, Diurnal variations, Magneto-optic effect, Scintillation, Meteorology, Greece.

The Athens center Ionospheric Institute recorded a large number of transmissions from active satellites S-66 and BE-C on 40 Mc/s fr. following a common program established by Joint Satellite Study Group. Some results on large scale irregularities are discussed and a new method to calculate the ionospheric horizontal gradient in electron content is presented.

AD-634 976 **Field 4A, 22B**
CFSTI Prices: HC$2.00 MF$0.50
The Johns Hopkins Univ., Silver Spring Md. Applied Physics Lab.
HIGH ALTITUDE RESEARCH AT THE APPLIED PHYSICS LABORATORY.
Rept. for Mar 46-Feb 51.
by L. W. Fraser. May 51, 44p Bumblebee-153

Descriptors: (*Atmospheric sounding, *Sounding rockets), (*Ionosphere, Atmospheric sounding), Cosmic rays, Solar radiation, Spectroscopy, Terrestrial magnetism, High altitude, Photography, Aerodynamics, Research program administration.

Identifiers: Aerobee, V-2 (Missile).

This report summarizes five years of work in which scientific experiments were performed principally through the use of V-2 and Aerobee rockets. A series of direct measurements was made of the total intensity of the cosmic radiation above the appreciable atmosphere over a wide range of geomagnetic latitudes. The primary cosmic-ray energy spectrum was determined, as well as the magnitude and sign of the charge; and a number of experiments in the reactions of the primaries in matter were performed. Solar spectra to wavelengths shorter than 2900 Angstrom units were obtained by means of rocket-borne spectrographs. The distribution of ozone with altitude in the earth's atmosphere was measured. Exploration of the earth's magnetic field at high altitude and at two geomagnetic latitudes disclosed evidence of a current layer in the E region of the ionosphere. High-altitude photographic techniques were developed through the use of rocket-borne cameras. By the use of the Aerobee rocket as a vehicle, aerodynamic research on a ramjet diffuser was carried out. (Author)

AD-635 039 **Field 4A, 7E**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ELECTRON IONIZATION AND LOSS PROCESSES AND RATES.
by C. M. Crain. Jun 66, 51p P-3389
Prepared for presentation at Conference on Ground-Based Radio-Wave Propagation Studies of the Lower Ionosphere, Ottawa, Canada, April 11-15, 1966.

Descriptors: (*Ionosphere, Ionization), (*Photochemistry, Ionosphere), (*Radiation chemistry, Ionosphere), (*Cosmic rays, Ionospheric disturbances), Protons, Electrons, Nuclear explosions, Fission products, Chemical reactions, Atmospheric sounding.

Cosmic rays and nuclear explosion fission products factors which relate to the ionization state in the region below roughly 100 km are summarized.

AD-635 162 **Field 4A, 18D, 22B**
CFSTI Prices: HC$6.00 MF$0.75
American Science and Engineering, Inc., Cambridge, Mass.
AN ELECTROSTATIC ANALYZER TO MEASURE AURORAL ELECTRON ENERGY AND ANGULAR DISTRIBUTIONS.
Final rept. 21 Jun-20 Oct 65.
by W. P. Reidy, and E. R. Hegblom. 28 Mar 66, 68p ASE-1211
Contract AF 19 (628)-5512
Proj. AF-5710
AFCRL-66-275

Descriptors: (*Electron density, *Atmospheric sounding), (*Radiation measurement systems, *Sounding rockets), Upper atmosphere, Space environmental conditions, Aurorae, Van Allen radiation belt, Electrostatics, Probes (Electromagnetic), Spectrum analyzers.

Identifiers: Electrostatic analyzers.

An electrostatic analyzer designed to measure the energy spectrum and pitch angle distribution of electrons between 2 and 50 kev in the upper atmosphere during an aurora is described. The details of the instrument's design, operation, and calibration are presented. The flights of two electrostatic analyzers on two Nike Iroquois rockets launched from Fairbanks, Alaska, in October 1965 are described; and a preliminary analysis of the data for one sweep over the energy range from 2 to 20 kev is presented. (Author)

AD-635 220 **Field 4A, 20F**
CFSTI Prices: HC$6.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
SKY ILLUMINATION PHENOMENA.
by Joseph Javis, and Daniel W. Michaels. 16 May 66, 108p ATD-66-55
TT-66-61677
Based on Soviet-Satellite-Western open sources pub. 1963-1966 and earlier (1958, 1961-1962). Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Sky brightness, Bibliographies), (*Optics, *Meteorological phenomena), Sky, Illumination, Noctilucent clouds, Zodiacal light, Twilight, USSR.

Contents: Airglow, Auroras, Noctilucent Clouds, Zodiacal Light, Gegenschein, Twilight.

AD-635 266 **Field 4A, 3B, 20F**
CFSTI Prices: HC$1.50 MF$1.00
Denver Univ., Colo. Dept. of Physics.
HIGH ALTITUDE ATMOSPHERIC TRANSMITTANCE AS OBSERVED OVER NORTHERN CALIFORNIA.
by David G. Murcray, Frank H. Murcray, and Walter J. Williams. May 66, 131p Scientific-3
Contract AF 19 (628)-5202, ARPA Order-366
Proj. AF-8662
Task 866201
AFCRL-66-410

Descriptors: (*Solar spectrum, *Infrared spectroscopy), (*Atmospheric sounding, Solar spectrum), Atmosphere, Light transmission, Meteorological balloons.

The solar spectrum from 3390/cm to 4060/cm as observed through the earth's atmosphere was measured during a balloon flight on September 30, 1965, at Chico, California. The atmospheric spectral transmittance for altitudes up to 3 1 km are presented both graphically and in a tabular form. The integrated absorption for each spectrum is also tabulated at 1/2 wavenumber intervals. The water vapor absorption measured at floating altitude is shown to increase proportional to (sec theta 0) to the 1/2 power thus precluding significant absorption contributions from local outgassing. Assuming uniform mixing above 3 1 km, the mixing ratio for water vapor is 0.00005 g/g, consistent with earlier results. (Author)

AD-635 301 **Field 4A, 20E, 20F**
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. Geophysical Sciences Lab.
WATER VAPOR STUDIES UTILIZING A THERMALLY TUNED RUBY LASER RADAR.
Final rept., pt. 1 on Optical Sounding II for 16 Jul 65-31 Mar 66.
by R. M. Schotland, J. Bradley, and A. Nathan.
Jun 66, 24p TR-66-9
Contract DA-36-039-AMC-03411 (E)
Proj. DA-1V0-14501-B-53A-02
ECOM-03411-F

Descriptors: (*Atmospheric sounding, *Lasers), (*Water vapor, Atmospheric sounding), Meteorological instruments, Optical instruments.

Experimental studies have been conducted utilizing a thermally tuned ruby laser radar to study the vertical profile of water vapor systems. Examples of thermal scans of the 6942.16A and 6942.38A water vapor lines are presented. Equipment has been assembled to study at high resolution (.02/cm) the line shape and strength of these lines. An engineering computation has been made of the temperature distribution within the ruby rod resulting from the energy absorbed from the pumping lamp. (Author)

AD-635 376 **Field 4A, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
ALBEDO AND SKY RADIANCE MEASUREMENTS IN GREENLAND.
Research rept.
by Fritz Kasten. Apr 66, 18p RR-180
Proj. DA-1V014501B52A02

Descriptors: (*Albedo (Astronomy), Greenland), (*Sky brightness, Greenland), Snow, Atmosphere, Optical properties, Solar radiation, Meteorology.

This paper presents the results of measurements made in June 1961 on the ice sheet of Northern Greenland. The following quantities were measured: total and visual albedo of the snow surface under overcast and blue skies as well as the corresponding albedos in several spectral ranges; vertical distributions of the luminance and of the radiance of densely overcast sky and snow surface in several spectral ranges; and azimuthal distributions of luminance and near-infrared radiance of overcast skies of different densities. The interdependence of these quantities and their relationship to whiteout are discussed on the basis of the measurements. It is concluded that in order to fully or partly overcome whiteout, the luminance distribution must be made more or less nonuniform. This may be accomplished by cloud seeding, dark objects on the ground, or the use of light of other than visible wavelength. (Author)

AD-635 390 **Field 4A**
CFSTI Prices: HC$7.00 MF$1.75
Arctic Meteorology Research Group, McGill Univ., Montreal (Quebec).
PROCEEDINGS OF THE STANSTEAD SEMINAR ON THE MIDDLE ATMOSPHERE (6TH), 26 JULY-6 AUGUST, 1965 AT STANSTEAD COLLEGE, STANSTEAD, QUEBEC PROVINCE, CANADA.
by B. W. Boville, and F. K. Hare. May 66, 344p
Scientific-2, Meteorology-80
Contract AF 19 (628)-4955
Proj. AF-8628
Task 862807
AFCRL-66-369

Descriptors: (*Stratosphere, Symposia), Atmosphere, Atmospheric sounding, Atmospheric motion, Ozone, Mathematical models.

A collection of papers and summaries of talks delivered as seminars on the middle atmosphere. The energetics and circulation of the stratosphere including the 26-month oscillation and upward extensions by rocket data are reviewed. Ozone and radiation problems are considered and related tropospheric studies receive some attention. (Author)

AD-635 523 **Field 4A, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
CIRCULATION OF THE MIDDLE AND UPPER ATMOSPHERE.
by Willis L. Webb. 1966, 22p
Presented at COSPAR International Space Science Symposium (7th), 16 May 1966, Vienna, Austria.

Descriptors: (*Atmospheric motion, Dynamics), Sounding rockets, Atmospheric sounding, Meteorological parameters, Atmosphere, Fluid mechanics.

Investigation of the Stratospheric Circulation through Meteorological Rocket Network observations has revealed the presence of a complex circulation system in the upper atmosphere. Detail structure range in scale from the hemispheric-annual monsoonal reversal which is a dominant feature of the stratospheric circulation (25-80 km) down to subkilometer-minutes variations characteristic of vertical profiles. A most important aspect of the stratospheric circulation is the strong diurnal temperature variation and resultant tidal circulation generated by the earth's rotation and ozone absorption of solar ultraviolet in a thin stratopause layer. This diurnal heat wave and tidal circulation has been shown to effectively stir the mesosphere and to provide special vertical motions such as those required to support noctilucent cloud particles and subsidence of the equatorial electrojet. Associated data has shown that the ionospheric and stratospheric circulation systems are not fully isolated, but are indeed interrelated, with a principal difference being a more active meridional global circulation in the ionospheric case. This difference is assumed to be due to an increasing importance with height of non-geostrophic influences on the circulation of the upper atmosphere. (Author)

N66-15353 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Pittsburgh Univ., Pa. Dept. of Physics.
IONOSPHERIC REACTION RATES IN THE LIGHT OF RECENT MEASUREMENTS IN THE IONOSPHERE AND THE LABORATORY, II.
by T. M. Donahue. 5 Aug 65, 40p
Contract NASr-179
NASA-CR-69351
Prepared in cooperation with Pittsburgh Univ., Pa. Space Research Coordination Center. Rept. no. SRCC-11.

Descriptors: *Ion-atom interaction, *Ionospheric ion density, *Ionic reaction, *Mass spectrometry, *Recombination coefficient.

For abstract, see T 66 16.

N66-15384 **Field 4A**
CFSTI Prices: HC$4.00 MF$0.75
Space Research Coordination Center, Univ. of Pittsburgh, Pa.
THE EFFECT OF LATERAL FLOW ON EXOSPHERIC DENSITIES.
Doctoral thesis.
by J. R. McAfee. 15 Sep 65, 118p SRCC-12
Contract NASr-179, Grant NSF-G-11309
NASA-CR-69352
Prepared in cooperation with National Science Foundation Grant NsG-416.

Descriptors: *Exosphere, *Mass flow, *Particle motion, *Atmospheric density, *Meteorology.

N66-15866 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Space Research Coordination Center, Pittsburgh Univ., Pa.
AN INTERPRETATION OF A FAR ULTRAVIOLET DAYGLOW EXPERIMENT.
by T. M. Donahue. 15 Oct 65, 30p SRRC-18
Contract NASr-179
NASA-CR-69623

Descriptors: *Far ultraviolet, *High altitude testing, *Resonance scattering, *Ultraviolet radiation.

N66-16185 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Alaska Univ., College. Geophysical Inst.
EFFECTIVE RECOMBINATION COEFFICIENT IN D-REGION.
Scientific rept. no. 1.
by R. Parthasarathy, and D. B. Rai. Sep 65, 41p
UAG-R-171
Contract NAS5-3595
NASA-CR-69892

Descriptors: *D Layer, *Lower atmosphere, *Meteoritic dust, *Recombination coefficient.

N66-16385 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE DEVELOPMENT OF THE FORBUSH DECREASE AND THE GEOMAGNETIC STORM FIELDS.
by S. I. Akasofu, and S. Yoshida. Dec 65, 28p
Rept. no. 65-41
Grants NsG-201-62, NsG-233-62
NASA-CR-69871

Descriptors: *Forbush decrease, *Geomagnetic storm, *Magnetic field, *Geomagnetic micropulsation.

N66-16393 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE AURORAL OVAL, THE AURORAL SUBSTORM, AND THEIR RELATIONS WITH THE INTERNAL STRUCTURE OF THE MAGNETOSPHERE.
by S. I. Akasofu. Nov 65, 49p Rept. no. 65-37
Grants NsG-201, NsG-233
NASA-CR-69872
Prepared in cooperation with National Science Foundation Grant NSF-GP-2721.

Descriptors: *Magnetospheric instability, *Ring current, *Geomagnetic storm, *Polar aurora.

N66-16558 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.

WIND LOADS ON VERTICALLY LAUNCHED VEHICLES AT VARIOUS GEOGRAPHIC LOCATIONS AND LAUNCH ALTITUDES.
by J. A. Cochrane, and R. M. Henry. Feb 66, 18p
NASA-TN-D-3271

Descriptors: *Vertical takeoff, *Wind pressure, *Launch site.

N66-17894 **Field 4A**
CFSTI Prices: HC$4.00 MF$0.75
GCA Technology Div., GCA Corp., Bedford, Mass.
INVESTIGATION OF THE D AND E REGIONS OF THE IONOSPHERE DURING THE INTERNATIONAL QUIET SUN YEAR.
by P. J. McKinnon, L. G. Smith, and L. H. Weeks. Mar 66, 104p
Contract NASw-820
NASACR-391

Descriptors: *International quiet sun year (IQSY), *Solar radiation, *Ultraviolet radiation, *D Layer, *E Layer, *Electron temperature, *Ionospheric electron density.

PB-169 874 **Field 4A, 14C**
CFSTI Prices: HC$5.60 MF$0.50
National Center for Atmospheric Research, Boulder, Colo.
AN AIRPLANE-MOUNTED SYSTEM FOR SENSING AND RECORDING RADIO NOISE IN CLOUDS,
by J. Doyne Sartor, and Paul A. Eden. Mar 66, 51p NCAR-TN-7

Descriptors: (*Noise (Radio), Clouds), (*Radio equipment, Airborne), Meteorological phenomena.

PB-170 767 **Field 4A, 4B**
CFSTI Prices: HC$4.00 MF$0.50
Imperial Coll. of Science and Technology, London (England). Dept. of Mathematics.
STUDIES OF THE PROBLEMS OF CELLULAR CONVECTION IN THE ATMOSPHERE.
Final rept.
by Durga Ray, and R. S. Scorer. Aug 63, 123p
Contract Cwb-10004

Descriptors: (*Convection (Atmospheric), Mathematical analysis), Atmosphere, Transport properties, Fluid mechanics.

Identifiers: Cellular convection.

PB-170 816 **Field 4A**
CFSTI Prices: HC$4.00 MF$0.75
Pennsylvania State Univ., University Park. Ionospheric Research Lab.
THEORETICAL ELECTRON DISTRIBUTIONS IN THE NOCTURNAL F-2 REGION AT MID-LATITUDES.
by J. D. Cummings. 30 Jun 66, 105p Scientific rept. no. 275
Grants NSF-G-18852, NSF-GP-5611

Descriptors: (*Electron density, Ionosphere), (*Ionosphere, Electron density), Atmosphere models.

This work is concerned with appropriate solutions of the continuity equation for the nocturnal F-layer electron distribution and is essentially an extension of a study of Dungey (1956). Temporal variations are dealt with utilizing ambipolar diffusion and recombination coefficients, whose values are an important consideration in any F-region study, deduced from the model studied. (Author)

AD-634 799 **See Field 7D**

AD-634 866 **See Field 22B**

AD-634 954 **See Field 7D**

AD-635 134 **See Field 8N**

AD-635 219 **See Field 7D**

AD-635 380 **See Field 20N**

4B. METEOROLOGY

AD-447 402 **Field 4B, 8F**
CFSTI Price: HC$6.00
Earth Sciences Div., Army Natick Labs., Mass.
WORLD MAPS OF HIGH DRY-BULB AND WET-BULB TEMPERATURES.
by Iven V. Bennett, Richard L. Pratt, and Roland J. Frodigh. Aug 64, 44p. Technical rept. EES-11
Proj. DA-LK025001A129
Availability: Original document in color until exhausted.

Descriptors: (*Climatology, Meteorological charts), (*Meteorological charts, Climatology), (*Humidity, Climatology), Atmospheric temperatures, Meteorological parameters, Maps, Nomographs.

This report presents a series of 18 original worldwide maps showing the patterns of extremes but more particularly the frequency and duration of high dry-bulb (> or = 100F) and high wet-bulb (> or = 70F) temperatures. Methods used in drawing the isolines for each map are presented and their accuracy (where estimated) analyzed. Notes are given to assist in interpreting each map or to explain its limitation in specific areas. As expected, Saharan Africa and southwestern Asia possess a large proportion of the total world area with high dry-bulb temperature. Nearly all of the Sahara and large areas in Saudi Arabia, Iraq, West Pakistan, and India commonly experience dry-bulb temperatures between 105 and 110F. Only small areas in other parts of the world have high frequencies of such temperatures. Truly high wet-bulb temperatures, close to or above 80F, are widely spread geographically only under humid tropic conditions of climate. They are found along the Pacific coast of southern Mexico, in the Amazon Basin, the Sudan region of Africa, the Mozambique, Tanganyika and Kenya coasts of Africa, southern and southeastern Asia, the islands of the East Indies, and the north coast of Australia. (Author)

AD-466 161 **Field 4B**
CFSTI Prices: HC$2.60 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
ON WIND SHEAR DISTRIBUTIONS FOR SMALLER SHEAR INTERVALS.
by O. Essenwanger, and N. Billions. 1 May 65, 30p
Proj. DA-1V014501B53A
AMC-RA-RR-TR-65-4

Descriptors: (*Atmospheric motion, Statistical distributions), (*Wind, Shear stresses), Mathematical prediction, Radiosondes, District of Columbia.

The problem of deriving frequency distributions of wind shear values for smaller shear intervals than measured by the radiosonde method is discussed. The relationship between shear interval and statistical parameters is given in equation form. This is confirmed by empirical data of instantaneous wind observations obtained from measurements taken aboard research rockets. These equations can be utilized to derive the parameters for wind shear distribution of smaller shear increments when frequency distributions of wind shear distributions for larger shear intervals are given. Several prediction schemes are analyzed, and results are checked on independent data not utilized for derivation of the general laws. The prediction method found most suitable, and introduced in this report, is tested on radiosonde data for Washington, D. C., to show the discrepancy between the normally used scaled down method and the analytical method as discussed in this report. Further, empirical frequency distributions of wind shear vectors are compared with theoretical distributions to evaluate the best approximations by an analytical distribution. (Author)

AD-634 777 **Field 4B, 16B, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
LITTLE JOHN MISSILE NO. 1054, ROUND NO. 644 AM (21 APRIL 1966).
Meteorological data rept.
Jun 66, 25p DR-25
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Little John, Ballistic meteorology.

Meteorological data gathered for the launching of Little John, Missile Number 1054, Round Number 644 AM, are presented in tabular form. (Author)

AD-634 877 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.75
Wisconsin Univ., Madison.
WINDSPEED ON MOUNTAINS.
Final rept., Feb 64-Nov 65,
by Eberhard W. Wahl. 31 Jan 66, 87p
Contract AF 19 (628)-3873
Proj. AF-8624
Task 862402
AFCRL-66-280

Descriptors: (*Wind, Mountains), (*Micrometeorology, *Mountains), Atmospheric motion, Velocity, Terrain, West Germany, Correlation techniques, Meteorology.

Based on data from six German mountain observatories, the behavior of windspeed distributions on top of mountain summits has been investigated. Relationships have been established linking the occurrence of winds on the mountain to the simultaneously observed flow in the free atmosphere at summit height in the vicinity. Since the windspeed data can be represented satisfactorily by means of double exponential distribution functions, a method of estimating the occurrence of high windspeeds based on these distributions has been developed. (Author)

AD-634 983 **Field 4B, 17I**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
APPLICATION OF RADAR TO MEASUREMENT OF SURFACE PRECIPITATION.
Semi-annual technical rept., 1 Sep 65-31 Mar 66.
by Pauline M. Austin. Apr 66, 15p
Contract DA-28-043-AMC-01472 (E)
Proj. DA-1V0-14501-B-53A-07
ECOM-01472-1

Descriptors: (*Meteorological radar, Atmospheric precipitation), (*Atmospheric precipitation, Measurement), Meteorology, Radar scanning, Radar equipment, Data processing systems.

Investigation of the application of radar to the measurement of surface precipitation includes assessment of the accuracy of radar measurements, development of new instrumentation and techniques, observations of storms, and analysis and interpretation of the data. The program comprises four tasks, and work in each during the past six months is described. Instrumentation: A relatively new AN/CPS-9 radar, obtained through ECOM, and a new 10 cm radar, obtained under a grant from National Science Foundation, have been installed at the Center for Earth Sciences. The 10 cm radar is not yet in operation as cabling and connections are not complete. The timing system and a digital sweep integrator for the new radar have

been built under this contract and are nearly ready to be incorporated into the system. Observations: Radar data were taken in 17 storms for approximately 100 hours. Raindrop samples were obtained on five days. Data Processing: No major data processing program is in progress at this time. Applications and Analysis: Four investigations currently in progress are described: (1) Computed particle-size distributions resulting from the aggregation of snow crystals; (2) Mesoscale precipitation patterns and their relation to macroscale parameters; (3) Water content and structure of thunderstorms; (4) Location of air mass thunderstorms in relation to local topographical features. (Author)

AD-635 022 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Directorate of Scientific Information Services, Ottawa (Ontario).
CLIMATE AND THUNDERSTORMS.
by V. I. Arabadzhi. Apr 66, 4p T-456-R
TT-66-61653
Trans. of Priroda (USSR) n2 p65-6 1966.

Descriptors: (*Climatology, *Thunderstorms), Meteorology, Tropical regions.

For abstract, see T 66 16.

AD-635 115 **Field 4B, 16B, 19D**
CFSTI Prices: HC$3.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
ATHENA FLIGHT NUMBER 044 (9 JUN 1966) AND ATHENA FLIGHT NUMBER 045 (10 JUN 1966).
Meteorological data rept.
by Gordon L. Dunaway. Jul 66, 58p DR-44
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Athena, Ballistic meteorology.

Meteorological data gathered for the launching of Athena Flight Number 044, Vehicle number D-021 and Athena Flight Number 045, Vehicle Number D-023 are presented for the Air Force Ballistic Missile Re-entry Systems Office and for ballistic studies. The data are presented in tabular form. (Author)

AD-635 185 **Field 4B, 22B**
CFSTI Prices: HC$2.00 MF$0.50
Texas Univ., Austin. Atmospheric Science Group.
DETERMINATION OF WINDS FROM METEOROLOGICAL ROCKETSONDES.
by Amos Eddy, C. E. Duchon, F. M. Haase, and D. R. Haragan. Nov 65, 34p Rept. no. 2
Contract DA-23-072-AMC-1564

Descriptors: (*Meteorological instruments, Sounding rockets), (*Wind, *Atmospheric sounding), (*Sounding rockets, Atmospheric sounding), Wind-direction indicators, Radiosondes, Parachute descents, Equations of motion.

Identifiers: ARCAS.

The equations of motion are derived for an object falling under the influence of gravity and aerodynamic drag. These equations are used to examine the response of the ARCAS parachute to hypothetical wind profiles in the region extending from 30 to 80 km. A computational scheme for determining the horizontal wind from the observed motion of any wind sensor influenced only by the above forces is presented, along with an example of its application to an ARCAS parachute flight. (Author)

AD-635 237 **Field 4B, 20F**
CFSTI Prices: HC$4.00 MF$0.50
Utah Univ., Salt Lake City. Dept. of Meteorology.
MICRO-METEOROLOGICAL RADIATION PROBLEMS.
Master's thesis.
by Dell Vaughn McDonald. Jun 66, 39p

Descriptors: (*Micrometeorology, *Infrared radiation), Meteorological phenomena, Optics, Harmonic analysis, Radiation (Heat transfer).

Identifiers: Radiative transfer.

This investigation concerns itself with two micrometeorological infrared radiation problems. (1) The first problem deals with the determination of long wave radiation along the line of symmetry inside and above a cone. Such a cone, embedded in the plane earth, is thought to idealize a valley. The radiative transfer equations were set up in such a manner as to deal with the special geometry involved. (2) The diurnal distribution of infrared water vapor cooling rates for a plane parallel and homogeneous atmosphere near the ground is investigated. In order to have continuous temperature distributions as a function of time, observed temperature gradients were subjected to harmonic analysis. (Author)

N66-15520 **Field 4B**
CFSTI Prices: HC$4.00 MF$0.75
Australian National Univ., Canberra. Mount Stromlo Observatory.
SYMPOSIUM ON THE MAGELLANIC CLOUDS.
by J. V. Hindman, B. E. Westerlund, and E. R. Wilkie. 1965, 112p

Descriptors: *Galaxy, *Planetary nebula, *Cloud, *Conference, *Hydrogen.

For abstract, see T 66 16.

PB-169 876 **Field 4B, 8G**
CFSTI Prices: HC$1.60 MF$0.50
Arizona Univ., Tucson. Lab. of Tree-Ring Research.
SUMMARY OF DENDROCLIMATIC RESEARCH DURING 1965,
by Harold C. Fritts. 9 Dec 65, 13p
Grant WGB-47

Descriptors: (*Climatology, Geologic age determination), (*Trees, Geologic age determination), (*Ecology, Climatology), Scientific research.

Identifiers: Dendroclimatic analysis.

PB-169 912 **Field 4B**
CFSTI Prices: HC$2.60 MF$0.50
Chicago Univ., Ill. Dept. of Geophysical Sciences.
A PROPOSED MECHANISM OF SNOWSTORM MESOJET OVER JAPAN UNDER THE INFLUENCE OF THE WINTER MONSOON.
Satellite and meteorology research proj.
by Tetsuya Fujita, and Kiyoshi Tsuchiya. Feb 66, 25p SMRP-RP-56
Grants NSF-GF-179, GEO-4
Sponsored in part by grant Cwb-WBG-34.

Descriptors: (*Jet streams (Meteorology), Japan), Upper atmosphere, Snow, Storms.

Identifiers: Mesometeorology project.

While Tsuchiya and Fujita (1966) were investigating mesoscale features of winter monsoon clouds over Japan by using satellite photographs and radiation data, a mesoscale upper-air disturbance was found to exist over the region of monsoon snowfall on the windward side of Hokkaido and northern Honshu as they block the strong northwesterly monsoon. A relatively dense upper-air network with an ayerage spacing of 200 km (120 miles) permitted us to analyze mesosynoptically the vertical structure of the upper-air mesosystem. The system was characterized by a cold dome directly above which warm dry air descended from an eroded tropopause. Analyses of 1963 and 1964 data revealed that the upper-air mesosystem stays more or less over the regions of monsoon snowfall while high-level winds blow through it within a few hours. To explain the formation and development of this upper-air mesosystem, a mechanism of mesoscale jet stream called 'snowstorm mesojet' has been proposed. (Author)

PB-169 913 **Field 4B, 22B**
CFSTI Prices: HC$2.60 MF$0.50
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
EXPERIMENTAL USE OF SATELLITE PICTURES IN NUMERICAL PREDICTION, PART II,
by Harold J. Brodrick, E. Paul McClain, and Mary Ann Ruzecki. Jan 66, 28p Rept. no. 36

Descriptors: (*Meteorological satellites, Weather forecasting), (*Numerical analysis, Weather forecasting), (*Weather forecasting, Numerical analysis).

Part I of this report, published previously, gave the basis and description of an experimental technique for modifying 500-mb stream fields in data-sparse areas on the basis of satellite data. The usefulness of the reanalysis method was assessed by comparing 36-hour barotropic forecasts based on both modified and unmodified initial fields. Verification statistics were presented for five developmental cases, although details of reanalysis were given for only one of these. Part II, presented here, presents the details of the remaining four cases. Also set forth are some general guidelines for analysis modification based on interpretation of cloud patterns viewed in satellite photographs. Technical problems involved in introducing analysis changes and evaluation of the effects of such changes are discussed. (Author)

PB-170 488 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
PRELIMINARY INVESTIGATION OF A NEW GENERATOR FOR SILVER IODIDE USING ISOPROPYLAMINE AS THE CARRIER.
by Roger L. Steele. 1966, 10p Mech. Eng. Tech. Paper-66.2, Atmos. Sci. Tech. Paper-76
Grants NSF-GP-1663, NSF-GA-311

Descriptors: (*Artificial precipitation, Nucleation), (*Silver compounds, Iodides), (*Amines, Artificial precipitation), Combustion chambers, Blowers, Nozzles, Complex compounds, Storage, Handling, Ice.

Identifiers: Silver iodide, Isopropyl amines.

A new system for producing silver iodide ice nuclei is described. Isopropylamine, instead of ammonia, is employed as the carrier. Silver iodide complexes readily with the amine and has the following advantages: high concentrations may be used without corrosion or deposition; solution preparation is simple and direct; straight isopropylamine may be used to purge the system after use; no supporting fuel is needed. The system produces high effectiveness over the temperature spectrum. Disadvantages are: dispersion cost may be 12% higher than with acetone; the amine is more toxic than acetone. However with minor precautions, the complex is easily stored and handled at ambient pressure temperature. Carbon steel or aluminum are used for containment. The simple, reliable storage and thermal processing system is described in detail. This is composed of a storage tank, connecting piping, hydraulic nozzle and combustion chamber which is supplied with air by means of an inexpensive blower. (Author)

PB-170 505 **Field 4B**
CFSTI Prices: HC$5.60 MF$0.50
Adelaide Univ. (Australia). Dept. of Physics.
DIURNAL VARIATIONS IN DENSITY, TEMPERATURE, PRESSURE AND WIND, BETWEEN

40 AND 90KM, IN THE SUB-TROPICAL LATITUDES OF THE SOUTHERN HEMISPHERE.
Technical note.
by Bryan Rofe, W. G. Elford, and Elizabeth M. Doyle. Apr 66, 55p TN-PAD-116

Descriptors: (*Atmospheric sounding, Australia), (*Meteorological parameters, Diurnal variations), Sounding rockets, Telemetering data, Meteorology.

Within 24 hours on May 10-11, 1965, ten HAD sounding rockets were fired at Carnarvon (25 degrees S), Western Australia. Useable results were obtained from eight firings, and measurements of diurnal and semi-diurnal oscillations in the basic atmospheric parameters of density, pressure, temperature and wind were made. At the same time at Adelaide (35 degrees S) wind velocities in the 70-100 km range were measured by the meteor-drift technique. To determine the values of the mean and periodic components of each quantity as a function of time and height, two methods of analysis were used. Comparison between the two methods was obtained. The results imply a more complex behaviour than that required by simple atmospheric tidal theory. (Author)

PB-170 635 **Field 4B**
CFSTI Prices: HC$2.00 MF$0.50
Weather Bureau, Washington, D. C. Techniques Development Lab.
A SYNOPTIC CLIMATOLOGY OF WINTER PRECIPITATION FROM 700-mb. LOWS FOR INTERMOUNTAIN AREAS OF THE WEST,
by Donald L. Jorgensen, William H. Klein, and August F. Korte. May 66, 29p Technical note TN-45-TDL-4

Descriptors: (*Climatology, Mountains), (*Atmospheric precipitation, Mountains), Micrometeorology, Air mass analysis, Meteorological parameters.

Identifiers: Synoptic climatology.

A synoptic climatology of precipitation resulting from upper closed Lows is developed for the intermountain areas of the West for the winter months of December, January, and February. Precipitation amoounts at about 280 stations for 12-hr. periods, centered at upper-air observation times and expressed as percentages of 7-day station amounts, are related to the positions of the Low centers at the 700-mb. level through the use of a moving grid system. The upper Lows are classified into three intensity categories according to the departure from normal of the central height. For each category the average precipitation amount, extent, and frequency of occurrence over the area of the grid system are presented. The area of maximum precipitation is found just southeast of the centers of intense 700-mb. Lows. As the intensity of the Low center decreases, not only does the frequency of precipitation diminish, but also the area of maximum frequency progressively shifts to positions south and west of the center. (Author)

PB-170 636 **Field 4B, 17I**
CFSTI Prices: HC$2.00 MF$0.50
National Severe Storms Lab., Norman, Okla.
PROBING AIR MOTION BY DOPPLER ANALYSIS OF RADAR CLEAR AIR RETURNS,
by Roger M. Lhermitte. May 66, 42p Technical note TN-46-NSSL-26

Descriptors: (*Clear air turbulence, Radar scanning), (*Doppler radar, Meteorological radar), (*Meteorological radar, Doppler radar), Atmospheric motion, Radar, Probes, Meteorology.

A Doppler radar has been used in central Oklahoma to probe the motion of invisible targets usually referred to as 'angels'. The large density of targets detected on certain days suggests the presence of a dense atmospheric 'plankton' drifting with the air. Uniform motion for all the targets in the area surveyed by the radar beam is confirmed by the systematic pattern of target radial motions as a function of radar beam azimuth. Target horizontal motion direction and speed are derived from the radial velocity-azimuth patterns and interpreted as horizontal wind. The small vertical motion of targets is also estimated from the data. This technique is applied to the analysis of wind variance and the study of a low-level jet. (Author)

PB-170 805 **Field 4B**
CFSTI Prices: HC$1.50 MF$0.75
Burroughs Corp., Paoli, Pa.
WEATHER OUTLINE CONTOUR GENERATOR.
Final rept.
Oct 65, 81p
Contract FA-WA-4693
Proj. FAA-231-001-01C
SRDS-RD-66-25

Descriptors: (*Meteorological charts, Preparation), (*Meteorological radar, Effectiveness), Weather forecasting.

The Weather Outline Contour Generator (WOCG) was built by the Burroughs Corp. for SRDS to demonstrate the feasibility of quantizing analog video so as to represent different intensity levels of weather clutter. These levels are subsequently displayed as three contour outlines. The equipment was built as a modification to the Radar Video Processor (RVDP) but as a separate unit that can be conveniently moved to different site locations for evaluation under different environmental conditions. The report contains a detailed description of the WOCG, including photographs showing how the output of the WOCG compared with raw radar data. The appendices contain a list of applicable references, glossaries of terms and symbols, and detailed electrical and logical schematics. (Author)

PB-170 814 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.75
Meteorological Satellite Weather Bureau, Washington, D. C.
MESOSCALE CELLULAR CONVECTION.
by Lester F. Hubert. May 66, 76p Rept. no. 37

Descriptors: (*Meteorological parameters, Convection), (*Convection, Meteorological parameters), Meteorological satellites, Cumulus clouds.

The large areal extent of mesoscale cellular patterns is cumuli suggests there exists a scale of mesoscale convection that is significant to air-sea exchange mechanisms. The purpose here is to bring together a representative sample of satellite and associated meteorological data concerning these cells, and to propose a hypothesis for them that is based on the extant work on Benard convection. As in the laboratory two classes of cells appear to exist: those with ascent in the cell centers and those with descent in the cell centers. Experiment and theory indicate this may be due to the vertical variation of eddy viscosity. It is suggested that the destabilizing effect of surface heating and cloud top cooling by radiation determine this vertical variation, and that these usually are of greater magnitude than evaporation cooling or release of latent heat. Shear and non- steady-state heating are unfavorable for these mesoscale cells, but rotation probably has no effect. Suggestions for future work are to construct a theoretical model that incorporates anisotropic, variable, eddy exchanges and diabatic energy sources other than latent instability. Suggested experimental work should be carried out in the atmosphere, not in the laboratory, and it should include measurements of eddy flux of heat and momentum as well as the diabatic energy sources. (Author)

AD-634 795 **See Field 17I**

AD-634 812 **See Field 4A**

AD-634 884 **See Field 4A**

AD-634 886 **See Field 17I**

AD-634 907 **See Field 4A**

AD-635 030 **See Field 17I**

AD-635 523 **See Field 4A**

PB-170 767 **See Field 4A**

5A. ADMINISTRATION AND MANAGEMENT

AD-462 001 **Field 5A, 11G, 7D, 20L K**
CFSTI Price: HC$7.00
Massachusetts Inst. of Tech., Cambridge.
RESEARCH IN MATERIALS SCIENCE AND ENGINEERING.
Annual rept. for 1964-1965.
Apr 65, 358p

Descriptors: (*Materials, Scientific research), Solid state physics, Crystal structure, Cryogenics, Thermodynamics, Spectroscopy, Semiconductors, Magnetism, Metallurgy, Metallography, Phase studies, Ceramic materials, Minerals, Corrosion, Superconductors, Mechanics, Polymers, Surfaces, Thermionic emission, Chemical engineering, Radiation damage, Instrumentation, Reviews.

Summaries are given of research progress in the following areas: chemical physics; solid state physics; electric, magnetic, and optical properties of materials and applications to devices; metallurgy and materials science; materials engineering. Separate sections cover work done at the National Magnet Laboratory, Instrumentation Laboratory, and Lincoln Laboratory.

AD-634 819 **Field 5A, 9B, 17B, 17I K**
CFSTI Prices: HC$3.00 MF$0.75
Lincoln Lab., Mass. Inst. of Tech., Lexington.
GENERAL RESEARCH.
Quarterly technical summary rept.,
by Frederick C. Frick, V. Alexander Nedzel, Stephen H. Dodd, Melvin A. Herlin, and Jerome Freedman. 15 May 66, 53p
Contract AF 19(628)-5167
Proj. AF-649L
ESD-TR-66-205
See also AD-630 918.

Descriptors: (*Data processing systems, Scientific research), (*Radar, Scientific research), (*Engineering, Scientific research), (*Solid state physics, Scientific research), Digital computers, Computer storage devices, Psychology, Control systems, Space surveillance systems, Radio astronomy, Planets, Microwave equipment, Lasers, Semiconductor devices, Radar antennas.

Identifiers: Haystack hill antennas, Millstone radar.

Summaries are given of progress and results in the following research areas: digital computers (computer systems, circuit development, magnetic film engineering, system programming and applications); computer components (magnetic films, optics, electron transport, advanced circuits); psychology (on-line computing services for scientists and engineers, human information processing, quantitative methods); computer systems (computation center development, hybrid computational facility); surveillance techniques (operation, maintenance, and improvements, space surveillance, lunar studies, planetary studies, atmospheric studies, radio astronomy, space communication); microwave components (introduction, haystack microwave components, solid-state amplifiers, VHF modification to TRADEX error horns); mechanical engineering (haystack, millstone, solid state research, laser radar, structures research); solid state device research, optical techniques and devices, materials research, physics of solids.

AD-635 193 **Field 5A, 20C, 20L, 9A K**
CFSTI Prices: HC$1.50 MF$0.50
Naval Ordnance Lab., Corona, Calif.
FOUNDATIONAL RESEARCH PROJECTS.
Quarterly rept., Jan-Mar 66.
by C. F. Cook, R. A. Buchanan, M. A. Butler, D. E. McCarthy, and I. E. Rainwater. 1 Jun 66, 44p
NAVWEPS-8852

Descriptors: (*Naval research, Reviews), (*Superconductors, *Tunneling (Electronics)), (*Infrared optical materials, Optical properties), (*Indium alloys, *Plasma oscillations), (*Dipole antennas, Very low frequency), (*Praseodymium, Spectra (Infrared)), Films, Wave transmission, Reflection, Antimony alloys, Microwaves, Resonance, Propagation, Lanthanum compounds, Promethium compounds, Fluorides, Absorption spectrum.

Identifiers: Indium antimonide, Lanthanum trifluoride, Praseodymium fluoride.

Five papers are presented on work performed under the Foundational Research Program: Dimensionally dependent plasma resonance absorption of InSb in a microwave field; Spectra of Pr (3 +) in LaF3 and PrF3 from 25 to 75/cm; Transmittance and reflectance of infrared optical materials from 2 to 50 microns; Tunneling currents across a barrier between thin superconducting films; VLF transmitting dipole.

AD-635 194 **Field 5A, 5I**
CFSTI Prices: HC$1.00 MF$0.50
Arizona Univ., Tucson. Dept. of Sociology.
FINAL SCIENTIFIC REPORT.
7 Jun 66, 9p
Grant AF-AFOSR-91-64
AFOSR-66-1180

Descriptors: (*Management engineering, Analysis), Personnel management, Behavior, Education, Statistical analysis.

Identifiers: Innovation (Technology).

The work accomplished is reported under four categories: (1) Exploration of the nature of and interrelations among a number of variables representing technological change, career progress, and personal and organizational factors; (2) Reporting results of the work to the scientific public; (3) Reporting results of the work to potential users; (4) Anticipated publications as a result of the research performed.

AD-635 201 **Field 5A, 12B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
THE ROLE OF RESEARCH IN ACTION PROGRAMS: THE 'LAMPPOST' APPROACH TO ACTION RESEARCH.
Professional paper.
by Alfred P. Parsell. 3 Jun 66, 14p SP-2488
Presented at the Annual Forum of the National Conference on Social Welfare (93rd) (Section III: Community Organization), Chicago, Ill., 3 Jun 66.

Descriptors: (*Decision making, Management engineering), (*Operations research, Effectiveness), Data, Management planning, Professional personnel, Research program administration, Sources.

The research function should not be put into the position of becoming an advocate in matters of policy-making or in the establishment of political and strategic courses of action. The research function should be able to provide information useful in the making of intelligent decisions on policy and strategy - and should be requested and held responsible for providing such information. It should not, however, be expected to provide such data after the fact, carefully tailored to rationalize decisions already made. The research man should be expected to compromise his function by becoming an apologist for the administration. Unfortunately, this is exactly the position that many so-called 'research directors' are forced into when they must operate within the staff or line organization of an action agency. As professionals, they usually possess unique knowledge of and skills in such areas as systematic planning, program design, and the assessment of program effectiveness. Moreover, as researchers, they are undoubtedly the best person to recognize and call attention to research needs in the program and to interpret research findings to program management. However, when functioning in such capacities, the role of the research director is primarily that of administrator or coordinator rather than that of researcher. It is the position of this paper that these essentially antithetical and usually conflicting roles be recognized for what they are, not only for the good of the program and its management, but also in the interests of effective and realistic research and evaluation. (Author)

AD-635 257 **Field 5A, 20E, 7C, 20B K**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
FOREIGN SCIENCE BULLETIN, 1966, VOL. 2, NO. 6.
Jun 66, 84p
TT-66-61680
A monthly review of selected foreign scientific and technical literature sponsored by the Department of Defense.

Descriptors: (*Scientific research, USSR), (*Plasma medium, *Lasers), (*Metalorganic compounds, *Polymers), (*Lithium compounds, *Crystal growth), Titanium compounds, Siloxanes, Niobates, Tantalum compounds, Ferroelectricity, Physics, Astronomy, Mathematics, Mechanics, Cybernetics, Medicine, Antarctic regions, Space flight, Motion picture photography, Symposia, Seismology, Geology, Water waves.

Identifiers: Polytitano siloxanes, Lithium tantalate, Lithium niobate.

Analytical Reviews: The possibility of laser action in a rapidly cooled, highly ionized plasma, by C. Shishkevish; Polytitanoorganosiloxanes and some other metal-containing polymers, by B. Nartsissov; Growth and ferroelectric property of lithium tantalate and lithium niobate single crystals, by J. G. Kourilo; Science and technology notes: Soviet scientific achievements during 1965; Review of medical research conducted by the Soviet Antarctic Expedition; Cinematography in Soviet space technology. Conferences: Twenty-Eighth Session of the Council on Seismology; Complex (Multi-Discipline) Investigations of the Earth's Crust and the Upper Mantle; Session on the Investigation of Wind-Produced Waves and Their Effect on Structures. Science personalities: M. I. Kontorovich; Ari Abramovich Shternfel'd. Book reviews: Bionics; Man Entered Space.

AD-635 275 **Field 5A**
CFSTI Prices: HC$3.00 MF$0.75
Texas Univ., Austin.
PRINCIPLES OF COMMUNITY PLANNING IN AIR BASE DEVELOPMENT.
Master's thesis.
by Willis Engle Shanks. Jun 66, 79p

Descriptors: (*Military facilities, *Air Force), (*Management planning, Military facilities), Construction, Housing, Buildings, Theory, Urban planning.

The report indicates a need for adequate planning in the Air Force facility program and some of the factors involved in base planning were discussed. The complexity of planning consideration was pictured.

N66-15348 **Field 5A**
CFSTI Prices: HC$1.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
TECHNOLOGY UTILIZATION WORKSHOP SUBJECTS STUDY, SUPPLEMENT 1.
by W. E. Bronner, and D. E. Kaufman. Jun 64, 20p NSL-64-125-1
Contract NAS7-277
NASA-CR-69288

Descriptors: *Industry, *Information transfer, *Aerospace technology, *Technology (GEN).

For abstract, see T 66 16.

AD-634 797 **See Field 5D**

AD-635 117 **See Field 14A**

AD-635 234 **See Field 12B**

AD-635 248 **See Field 5I**

AD-635 261 **See Field 5I**

AD-635 503 **See Field 10B**

AD-635 531 **See Field 12A**

PB-169 476 **See Field 15E**

PB-169 939 **See Field 13B**

PB-169 940 **See Field 13B**

PB-169 941 **See Field 13B**

PB-170 306 **See Field 5C**

PB-170 390 **See Field 11E**

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-437 781 **Field 5B**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
MECHANIZED DOCUMENTATION: THE LOGIC BEHIND A PROBABILISTIC INTERPRETATION.
by M. E. Maron. Apr 64, 23p P2898
Prepared for presentation at the Symposium on Statistical Association Methods for Mechanized Documentation, Smithsonian Inst., Washington, D. C., 17-19 Mar 64.

Descriptors: (*Documentation, Automation), Probability, Computer logic, Computers, Theory.

AD-635 020 **Field 5B**
CFSTI Prices: HC$3.00 MF$0.50
Lehigh Univ., Bethlehem, Pa. Center for the Information Sciences.
AN ANALYSIS OF QUESTIONS AND ANSWERS IN LIBRARIES.
Master's thesis.
by Caroline E. Hieber. Jun 66, 56p Rept. no. 1
Grant AF-AFOSR-724-66
Proj. S-235
AFOSR-66-1410
Rept. on Studies in the Man-System Interface in Libraries. See also PB-167 971 and PB-167 972.

Descriptors: (*Libraries, *Information retrieval), Bibliographies, Scientific research, Documentation.

Identifiers: User surveys.

Traditional methods of analyzing questions and answers as they occur in reference libraries are discussed and criticized. Methods of examining questions, the question-answering process, and answers to questions are evaluated. A pragmatic

scheme is suggested which classifies answers by their formats, dividing them into exact-reproduction type, fill-in-the-blank type, short descriptive type, information-about type, and list-of-references type. This classification is applied to a collection of actual inquiries. Recommendations for further testing of the suggested classification are given, with a discussion of its value in present and future libraries. (Author)

AD-635 091 **Field 5B, 5G**
CFSTI Prices: HC$1.00 MF$0.50
Little (Arthur D.), Inc., Cambridge, Mass.
THE INTERPRETATION OF WORD ASSOCIATIONS.
by Vincent E. Giuliano. 1963, 8p
Contract AF 19(628)-3311
ESD-TDR-64-527

Descriptors: (*Computational linguistics, Word association), (*Word association, *Documentation), Linguistics, Analysis, Abstracts, Automatic, Probability, Vocabulary, Information retrieval, Computers, Syntax, Statistical tests.

It is argued that it is possible to measure at least two kinds of word associations: 'synonymy' associations, which relate words according to likeness of meaning, and 'contiguity' associations, which relate words according to probable relationships among their physical designata. Formulas which measure both types of association are developed for content analysis and automatic abstracting. This paper is concerned with possible linguistic interpretations of such word association measures. (Author)

AD-635 104 **Field 5B, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Little (Arthur D.) Inc., Cambridge, Mass.
HISTORICAL FOUNDATIONS OF RESEARCH ON STATISTICAL ASSOCIATION TECHNIQUES FOR MECHANIZED DOCUMENTATION.
by Paul E. Jones. 1966, 6p
Contract AF 19(628)-3311
ESD-TDR-64-528

Descriptors: (*Documentation, *Word association), (*Statistical analysis, Word association), History, Data processing systems, Linguistics.

Ultimately, in statistical association research of the type which is discussed in this Symposium, the data under analysis are taken from a symbol system generated by man. The symbol system may comprise, for example, a text prepared for communication in natural language, or it may be a pattern of terms assigned to a document collection where the purpose of the indexing relates to the retrieval of the documents. Ordinarily the purpose of the system can be well defined, but the mechanism for producing the symbols (uttering words, indexing documents) is poorly understood. As attempts are made to unravel the statistical properties of these symbol systems, the unknown processes which underlie formation of the data are in fact under scrutiny. Thus in examining the effects of the unknown symbol-producing mechanism, problems continue to be studied which have caught the attention of the greatest intellects of Western culture. (Author)

AD-635 132 **Field 5B, 5I**
CFSTI Prices: HC$2.00 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
PROJECTED MANPOWER NEEDS, AND PROJECTED TRAINING REQUIREMENTS FOR OPERATORS AND USERS OF FUTURE STINFO SYSTEMS.
Technical rept.
by C. Dennis Fink, Herbert B. Leedy, and John F. Hayes. Jun 66, 40p TR-66-7
Contract DA-44-188-ARO-2
Proj. DA-2J024701A712-01

Descriptors: (*Technical information centers, *Personnel management), Department of Defense, Army, Information retrieval, Training, Personnel, Manpower studies, Documentation, Supervisory personnel, Operators (Personnel), Handbooks, Periodicals, Training devices, Specifications, Libraries.

Identifiers: STINFO.

Training problems which might arise due to establishment of new Department of the Army Scientific and Technical Information (DA STINFO) systems were examined with respect to projected manpower requirements, personnel supply, and training requirements. It was concluded that (a) future needs for system designers can be met through the use of contractor and senior DA STINFO personnel; (b) future needs for administrators and operators of STINFO centers and systems will not be great, provided that the DA can retain those persons now in the DA STINFO system; (c) training of STINFO system administrators and operators can be improved, and suggestions were made regarding the use of handbooks, job aids, and monthly publications' (d) training of administrators and operators for new STINFO systems should await the development of fairly precise specifications for these systems; and (e) the need to train and/or familiarize 'users' of STINFO systems is a crucial problem which needs immediate attention. User training procedures and materials, to include the development of user handbooks and job aids, are discussed. (Author)

AD-635 163 **Field 5B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
TIP USER'S MANUAL. A GUIDE FOR ON-LINE SEARCH AND RETRIEVAL OF THE CURRENT LITERATURE IN PHYSICS.
First ed.
by M. M. Kessler. 1 Dec 65, 27p

Descriptors: (*Physics, *Information retrieval), (*Instruction manuals, Information retrieval), Search theory, Documentation, Data storage systems, Programming (Computers).

Identifiers: TIP.

For abstract, see T 66 16.

AD-635 164 **Field 5B, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
TIP PROGRAM DESCRIPTION.
by William D. Matthews. 1 Jan 66, 13p
Supported in part by NSF, ONR and ARPA.

Descriptors: (*Physics, Information retrieval), (*Information retrieval, *Programming (Computers)), Data storage systems, Search theory, Documentation.

Identifiers: TIP.

TIP is a command program to search and retrieve from the bibliographic data files maintained by the Technical Information Project. There are two sections to the TIP program, the input request interpreter and the data retrieval section. The user types several requests and signals that his input is finished; then the retrieval section answers his requests. (Author)

AD-635 200 **Field 5B**
CFSTI Prices: HC$3.00 MF$0.50
System Development Corp., Santa Monica, Calif.
A BIBLIOGRAPHY ON INFORMATION SCIENCE AND TECHNOLOGY FOR 1966. PART I.
Technical memo.
by Frances Neeland. 1 Jul 66, 54p TM-3008/001/00
Sponsored in part by NSF and American Documentation Inst.

Descriptors: (*Documentation, Bibliographies), Information retrieval, Periodicals, Indexes, Subject indexing, Linguistics, Classification, Libraries, Reading machines, Programming (Computers), Automatic.

The continuing bibliography is intended primarily for the use of the authors of chapters in 'Annual Review of Information Science and Technology.' The style of entries has been modified to suit the author's requirements. In order to reduce the gaps left in the 1965 issues, this part of the bibliography incorporates additional 1965 references cited by the authors of the first volume of the 'Review.' (Author)

MiscPub-276 **Field 5B, 9B**
CFSTI Prices: HC$2.00 MF$1.00
National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
COOPERATION, CONVERTIBILITY, AND COMPATIBILITY AMONG INFORMATION SYSTEMS: A LITERATURE REVIEW.
by Madeline M. Henderson, John S. Moats, Mary Elizabeth Stevens, and Simon M. Newman. 15 Jun 66, 144p
Availability: Prepared in cooperation with National Academy of Sciences/National Research Council, Washington, D. C. Office of Documentation. Hard copy also available from Superintendent of Documents, GPO, Washington, D. C. 20402, $2.00.

Descriptors: (*Documentation, State-of-the-art reviews), Indexes, Reports, Abstracts, Processing, Subject indexing, Information retrieval, Standardization, Automation, Periodicals, Libraries, Classification, Programming languages, Data storage systems, Data processing systems.

Identifiers: Information systems, Information centers, Atomic Energy Commission, Defense Documentation Center, National Aeronautics and Space Administration, Thesauri, Clearinghouse for Federal Scientific and Technical Information, Descriptive cataloging.

The purpose of the study of the literature on which this report is based was to examine those problems in the field of documentation and in the operation of information systems which could possibly be solved or alleviated by some greater measure of cooperation, convertibility, or compatibility among systems, particularly those systems for handling scientific and technical information supported in whole or in part by the United States Government. An account is given of early developments and general background information about organizations active in cooperative documentation efforts. Current cooperative activities are then discussed in terms of dissemination and publication of secondary sources, acquisition and exchange of publications, analysis and identification, systematization and terminology control, storage and search, and standardization. General problem areas, special problems created by changes in the nature of the documentary materials to be handled and special problems raised by the prospects for mechanization are then discussed. A final section raises questions with regard to the implications for future progress. (Author)

PB-170 719 **Field 5B**
CFSTI Prices: HC$3.00 MF$0.75
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
EDUCATION AND TRAINING OF INFORMATION SPECIALISTS IN THE U. S. A.
by Marilyn C. Bracken, and Charles W. Shilling. May 66, 74p BSCP-24-66
NSF Scientific Documentation Project. See also PB-170 720.

Descriptors: (*Libraries, Education), Management engineering, Training, Computers, Universities, Systems engineering, Information theory, Information retrieval, Cyberne-

tics, Linguistics, Data processing systems, United States.

Identifiers: Information sciences, Information systems, Information centers.

The field of information science in the United States can be defined as that field of academic study and professional practice concerned with the nature, handling and function of information and with all aspects of its generation, control and use in society. The information sciences curricula are derived from many programs, including library science, linguistics, systems engineering, business administration, information control, business data processing, editing and writing, archives management, communications and graphic arts. The development of information sciences programs has been both evolutionary and revolutionary in the United States. There are a number of broad areas that have tended to provide the initial direction for the emerging field of information science and technology. The major disciplines which have contributed to this development are the library sciences, management sciences and computer sciences. Two factors of prime importance are: (1) the emerging technology that permits information handling techniques not practical or feasible heretofore and, (2) individual initiative of private and governmental institutions causing programs to emerge independently. Also the curricula have been influenced by concomitant research and operational programs. No institution in the United States appears to regard its program as static. (Author)

PB-170 720 **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
EDUCATION AND TRAINING OPPORTUNITIES FOR INFORMATION SCIENTISTS 1959-1963.
by Joe W. Tyson. Aug 63, 26p BSCP-14-63
NSF Scientific Documentation Project. See also PB-170 719.

Descriptors: (*Libraries, Education), Training, Symposia, Universities, Information theory, Management engineering, Systems engineering.

Identifiers: Information sciences, Information systems.

The study is the product of a request from the Executive Committee of the U. S. Subcommittee to the International Federation for Documentation (FID), whose purpose was to provide supporting evidence and documentation for a series of recommendations concerning education and training. The specific task reported upon is an investigation of certain types of education and training activities for (and leading to the professional competence of) information scientists. Tabular portions of the report are arranged chronologically and by concept category. During a given year the several types of education and training such as institutes, symposia, conferences, in-service and on-the-job training, and formal academic courses leading to an advanced degree are cited separately. An institute is defined as a meeting held by a continuing group, a conference may be called by a group specially constituted for the purpose of the meeting, a symposium is held by an organization within the academic community, in-service activities are those which require a sustained and continuing effort on the part of the trainee, and on-the-job activities are those which do not have a sustained or continuing basis but occur after the trainees regular employment activities. (Author)

PB-170 721 **Field 5B**
CFSTI Prices: HC$1.00 MF$0.50
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
SCIENTIFIC LITERATURE FOR NEWLY DEVELOPING COUNTRIES.
by Charles W. Shilling, Barbara Geving, Joe W. Tyson, and John Paul Dickson. Jan 64, 24p BSCP-17-64
NSF Scientific Documentation Project.

Descriptors: (*Scientific research, Periodicals), Documentation, Reports, Biology, Medicine, Agriculture, Drugs, United States, USSR.

Identifiers: Underdeveloped countries, Literature.

'Scientific literature' is defined as primary serial literature of regular issuance and originating in the United States of America. CONCLUSIONS: Newly emerging, underdeveloped and less developed nations, faced with twentieth century necessity for change within their own historical and social contexts, are severely handicapped in their efforts to move forward by the lack of effective scientific communication with the United States and Free World Nations and by the lack of adequate sources of up-to-date scientific information, particularly in the life sciences. Preliminary investigation, by life scientists, conferring on the spot with their opposite numbers in developing countries, has substantiated the belief that U. S. scientific literature is widely lacking and desperately needed, if these countries are to attain scientific 'status' in the Free World community. Surveys, conducted within the U. S. to determine whether a broad spectrum of the civic, business, education, institutional and governmental organizations are sending scientific literature overseas, have shown that only an insignificant amount of such literature is being forwarded, either on a regular or intermittent basis.

SC-R-66-846 **Field 5B, 9B, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
DIGITIZING. A PHASE I SOLUTION TO ENGINEERING AUTOMATION,
by A. D. Bridegam. Feb 66, 32p
Prepared for presentation at the Engineering Graphics Management Seminar (3rd) University of Southern California, Los Angeles, Calif., January 28, 1966.

Descriptors: (*Engineering, Automation), (*Mechanical drawings, Digital systems), (*Digital systems, Mechanical drawings), (*Printed circuits, Digital systems), Graphics, Programming (Computers), Punched cards, Punched tape, Machine tools.

Identifiers: Automatically programmed tools.

The paper describes use of a coordinate digitizer as a 'programming machine' for automatic drafting, engineering analyses, drafting aids, and experimental N/C machining. It is intended to reveal an approach to the problem of initiating an engineering automation system. Basically the digitizer system consists of two devices to extract data from a drawing: the reading table, which is quite similar to a standard vertical drafting table and contains a movable reading head, and a set of readout buttons which are attached immediately adjacent to the reading head cursor. The reading table is electrically tied to the digitizer control system. This control is a completely digital system which receives coordinate information from the reading table in increments as small as 0.001, and then, depending on various switch settings, transmits the information to a set of output devices. To the original graphical input record (the printed-circuit layout) there have been added layouts, part drawings, and sketches. To the original output (printed-circuit master tapes) there have been gained program decks for engineering analysis, point definitions for APT part programs, and N/C tapes for two-axis machine tools.

IDO-12051 **See Field 6R**

PB-169 555 **See Field 13F**

5C. ECONOMICS

AD-415 767 **Field 5C, 5D**
CFSTI Price: HC$3.00
RAND Corp., Santa Monica, Calif.
SAVINGS AND THE MEASUREMENT OF 'SELF-HELP' IN DEVELOPING COUNTRIES,
by Charles Wolf Jr. Apr 63, 55p RM-3586-ISA
Contract SD-79, ARPA Order-189-61

Descriptors: (*Government (Foreign), Economics), (*Economics, Government (Foreign)), (*United States Government, Government (Foreign)), Foreign policy, Costs, Mathematical models, Curve fitting, Budgets, Asia, Latin America, Africa, Middle East, United Nations.

Identifiers: Underdeveloped countries, Savings, Gross National Product, AID.

A method is described for dealing with the problem of self help. The method consists of deriving standards or 'norms' for individual countries from a multiple regression model that expresses some indicator of performance (in this case, savings) as a function of several indicators of socio-economic structure. Several different savings models are described which are similar in that they express savings as a function of the same types of structural indicators: Gross National Product (GNP); per capita GNP; urbanization, measured alternatively by urban income or urban population; and international trade. Also discussed is the data that are used, principally derived from United Nations and AID sources, as well as the reservations that should be observed in the use of the data. Some of the empirical results are summarized for the different models and for the regional grouping for Asia, Latin America, Africa, and the Middle East. Consideration is presented of the possible uses to which the approach might be put; suggests additional work that would be desirable in order to develop and refine the method; and outlines a number of caveats and qualifications concerning data reliability and other matters that apply to this approach.

AD-420 821 **Field 5C**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
THE ESTIMATION OF SHORT-RUN DEMAND AND SUPPLY FROM MARKET DATA CONTAINING SEASONAL PATTERNS,
by George S. Fishman. Sep 63, 26p P-2784

Descriptors: (*Economics, Analysis of variance), (*Food, Costs), Meteorological parameters, Production, Banking, Sources, Periodic variations, Statistical distributions.

The purpose of the paper was to acquaint economists with the use of spectral analysis as an aid in identifying short-run demand and supply from market data. It was shown that the seasonal and purely random components of price and quantity series can allow us to distinguish short-run demand from supply providing that at least one of the components results in a cross-spectral representation whose sign is opposite to those of the remaining components' representations. The short-run schedules are actually linear combinations of independent processes. In this sense, the analysis of demand and supply differs from the traditional approach in which long-run phenomena are removed and the aggregate remainders are used to estimate short-run demand and supply. Disaggregating the price and quantity processes allows us to take advantage of the greater certainties in prediction associated with the regularly recurring seasonal patterns, as compared with the purely random processes whose means are the best estimates to be used in prediction. (Author)

AD-422 015 **Field 5C**
CFSTI Price: HC$13.60
RAND Corp., Santa Monica, Calif.
COMMUNIST CHINA'S FOREIGN TRADE PRICE STRUCTURE AND BEHAVIOR, 1955-1959,
by Feng-hwa Mah. Oct 63, 137p RM-3825-RC

Descriptors: (*China, Commerce), (*Commerce, Foreign policy), Costs, USSR, Europe, Statistical analysis.

It is found that for 17 to 33 per cent of Communist China's annual imports from the USSR, the Soviet-Chinese unit values are higher than (1) those of free countries' imports from the USSR, or (2) those of Communist China's imports from free countries. In comparing Communist China's and Free Europe's imports from the USSR, it is found that for roughly 8 out of every 10 commodities sold to both Communist China and Free Europe, the USSR charged Communist China higher unit values during 1955-1957. In 1958 and 1959, such higher unit values extended to about 9 out of every 10 commodities. For 33 to 44 per cent of Communist China's annual exports to the USSR, roughly one-half of the Chinese-Soviet unit values are lower than (1) those of Free Europe's exports to Russia, (2) those of Communist China's exports to free countries, or (3) world market prices. For the other half, the Chinese-Soviet unit values are either higher, or show irregular relationships when compared with the unit values involving free countries. In the comparison of Communist China's and Free Europe's exports to the USSR, the unit values are found to be unfavorable to Communist China in 4 of the 5 years covered (the unit value ratio is unity in 1957).

AD-635 189 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Research Analysis Corp., McLean, Va.
DERIVATION OF 1959 VALUE-ADDED WEIGHTS FOR ORIGINATING SECTORS OF SOVIET GROSS NATIONAL PRODUCT.
Technical paper.
by Stanley H. Cohn. Apr 66, 37p RAC-TP-210
Contract DA-44-188-ARO-1

Descriptors: (*Economics, *USSR), Wages, Industries, Agriculture, Construction, Transportation, Communication systems, Commerce, Consumption, Distribution (Economics), Money, Costs.

The study on the derivation of national product originating in seven sectors of the Soviet economy is intended to provide the weights for indexes of gross national product (GNP) appearing in contributions by the author to the Joint Economic Committee of Congress and in internal RAC publications. The first section of the report describes the modification of conventional Western national accounting methodology to suit conditions imposed by the Soviet institutional environment and data availability. In this connection the differences between the Soviet concept of national accounting and that used by the author are presented. The major estimating effort is concerned with wage-type incomes, the largest element in cost of national product. Three estimating procedures have been used depending on the nature of official estimates: national income originating, the wage portion of gross sector expenditures, and scattered income flows and expenditures. For most of the sectors alternative approaches have been used with little variation between resulting estimates. Estimates were subsequently derived for the other three elements of cost: interest, rent, and depreciation charges. For these factors both Soviet magnitudes and US analogues have been used. When the various cost elements are combined and distributed by sector, sectors of origin weights are obtained. As compared with origin weights for the US economy, the Soviet economy is conspicuously oriented toward agriculture and, to a lesser extent, construction and much less oriented toward the consumer activities of commerce and services. The basic estimates can also be used to derive the weights for labor and capital in the production function for national products. The approximate 7-to-3 devision for labor and capital is strikingly close to that for the US and other major industrialized economies. (Author)

AD-635 295 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
OPTIMAL CAPITAL POLICY, THE COST OF CAPITAL AND MYOPIC DECISION RULES: THE CASE OF CHANGING DEPRECIATION AND EXTENSION TO s COMMODITIES.
Technical rept.
by Carlo Castelli. 6 Jul 66, 44p TR-143
Contract Nonr-225 (50)
Proj. NR-047-004

Descriptors: (*Decision making, *Money), Optimization, Economics.

This is an extension of Professor Arrow's paper on 'Optimal Capital Policy, the Cost of Capital, and Myopic Decision Rules.' First, an alternative method of solution of the renewal equation is given. Then the optimal rule is extended to the case of many commodities with fixed depreciation. Then the case is considered of variable depreciation and the optimal rule for this, extended to the case of many commodities. Necessary and sufficient correlations for the optima are carefully studied. (Author)

PB-169 482 **Field 5C, 12A, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
FORECASTING AND ESTIMATING. PHASE THREE,
by Ira F. Doom, and Marvin Tummins. 19 Nov 65, 36p Rept. no. 0248
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Mathematical prediction, Tests), (*Roads, Mathematic prediction), (*Economics, Mathematical prediction), Gasoline, Consumption, Money, Vehicles, Statistical analysis, Graphics, Errors, Virginia.

Identifiers: Taxes, Econometrics.

In Phase Two of the Forecasting and Estimating Study an adjustment routine was developed and applied to projections of highway data and related information. In almost every case the consistency and accuracy of these projected variables were improved. In this phase the adjustment routine was tested more extensively and modified on the basis of these results. In the first section of the report, forecasts derived from a systematic application of this routine are presented. Variables forecast include gross gallons of gasoline consumed in Virginia; gross motor fuel tax revenues of Virginia; number of vehicles registered in Virginia and the United States; and gross national product and the consumers price index. In the remaining sections of the study the rationale of the adjustment routine is examined, evidence of its success had it been used in the past is presented, and specific procedures by which straight-line projections were modified are described in detail.

PB-170 266 **Field 5C, 8F, 5K**
CFSTI Prices: HC$3.00 MF$0.50
Checchi and Co., Washington, D. C.
THE POTENTIAL POWER OF TOURISM ACOMA RESERVATION (NEW MEXICO).
Jan 63, 58p
Availability: Original document in color until exhausted. Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, New Mexico), (*New Mexico, Economics), (*Recreation, Economics), Costs, Commerce, Employment, Traffic, Roads, Lakes, Water supplies, Power supplies, History.

Identifiers: Tourist industry, Indian reservation, Area redevelopment, Recreation facilities.

On the positive side, the Reservation has five factors working for it. It has two potentially strong tourist attractions in Sky City (Acoma Pueblo, the oldest inhabited settlement in the United States), and the Enchanted Mesa. It is reasonably close to growing Albuquerque. Heavy passenger traffic on U.S. Highway 66 runs through the northern section of the Reservation. There is a possibility of expanding a small lake on the Reservation to attract fishermen and recreationists; and the Reservation adjoins Laguna Reservation (to the east) which has tourism potentials in its own right, and therefore could attract rourists to this area. On the negative side, the Tribe lacks skills and experience in the tourism field, and also lacks capital. Within the Reservation itself, including the area with the greatest tourism potentials, there is a lack of utilities. To develop tourism, the Tribe must draw upon a combination of markets: in-transit highway traffic, convention delegates visiting Albuquerque, local tourists and recreationists, and vacationers staying in the area (probably on the Laguna Reservation). What is needed to take advantage of this combined market is the restoration of Sky City and the development of the Enchanted Mesa.

PB-170 292 **Field 5C, 5F, 8F, 11L**
CFSTI Prices: HC$7.00 MF$1.75
MacDonald Associates, Inc., Washington, D. C.
A FOREST INDUSTRY PROCESSING AND MARKETING COMPLEX FOR EASTERN KENTUCKY.
Phase no. 3.
30 Nov 62, 392p
Contract Cc-5888

Descriptors: (*Economics, Kentucky), (*Kentucky, Industries), (*Wood, Industries), (*Industries, Kentucky), Forestry, Labor, Transportation, Natural resources, Commerce, Processing, Manufacturing methods, Management engineering, Site selection.

Identifiers: Area redevelopment, Wood industry.

This report presents the findings of extensive studies concerned with the function and design of a wood processing and marketing complex recommended for Eastern Kentucky. Background investigations were conducted and reported at an earlier date as Phase I and Phase II studies under the same contract. These previous investigations developed details of forest, human, physical, and economic resources and their potential influence upon the success of a forest based industry wuch as might be established in the physiographic region under consideration. The current studies correlate these resources into the design of an integrated manufacturing and marketing activity capable of generating profitable business on a scale that will result in significant economic contribution to the region. It is intended that this report will serve as a guide to the preparation of a formal corporate prospectus. To this end, the content has been developed in a manner that will permit it to be used as a reference in support of such a prospectus. Because of this, flow diagrams, cost estimates, and economic projections have been developed with accurate detail. Recommenuipment and projected costs are based on today's market and, in many instances, reflect quotations and recommendations prepared by various machinery manufacturers especially for this project.

PB-170 299 **Field 5C, 8G, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Johnson, Horrigan and Yaple, Erie, Pa.
A FEASIBILITY STUDY: THE POWDER MILL SITE, FAIRMONT, WEST VIRGINIA.
1962, 54p
Contract Cc-5835

Descriptors: (*Economics, West Virginia), (*West Virginia, Economics), (*Industries, West Virginia), Site selection, Feasibility studies, Employment, Labor, Costs, Terrain, Roads.

Identifiers: Industrial parks, Area redevelopment.

Conclusions: While the necessary services are available within a reasonable distance and (with the exception of rail service) could be extended to the Powder Mill Site at a reasonable cost, the high cost of grading alone virtually rules out the feasibility of developing the site as a marketable industrial park. The same conclusion is apparent in the context of development of the Powder Mill Site for use by a single large industry. It would appear that the only basis on which the site might be developed and sold to industry, whether for several industries, or one, might be on the basis of subsidized development. If all but approximately $560,000 to $700,000 of the development costs were to be written off in the interest of encouraging the growth of local industrial payrolls (it is anticipated that a potential of some 1,500 jobs is represented on this site), the resulting land price, based on 70 useable acres would fall in the range of from $8,000 to $10,000 per acre. Assuming a well planned and efficiently managed industrial park, it is anticipated that the land could be marketed with a price in this range. Unless the cost of developing the Powder Mill Site is subsidized in the interest of encouraging local industrial payroll, there seems little value in further considering this site for industrial use. (Author)

PB-170 306 **Field 5C, 5A, 8F, 5K**
CFSTI Prices: HC$6.00 MF$1.25
American Scientific Corp., Alexandria, Va.
CREATING A CERAMICS INDUSTRY ON THE BLACKFEET RESERVATION,
by Emmett F. Deady, Saul S. Gefter, Natalie Marra, and Robert F. Custard. Sep 65, 203p
Contract EDA-14-20-0650-1379

Descriptors: (*Economics, Montana), (*Montana, Industries), (*Industries, Ceramic materials), Feasibility studies, Labor, Commerce, Employment, Management engineering.

Identifiers: Ceramics industry, Indian reservations, Area redevelopment.

The study reports that there exists at the Blackfeet Reservation a sufficient labor pool endowed with ceramic production capabilities and that all other factors controlling the success of such an industry are in evidence, provided the enterprise can be financed. It resolves that the plant should be directed to the production of art pottery, particularly fine figurines and pottery designed to reflect the American Indian tradition. It determined that the optimum method of production is slip casting but recommends flexible molding as soon as practical and suggests lines of experiments so directed. The study examines the market for Indian art pottery and recommends specific items at specific prices, and undertakes to predict sales quotas of such items. It shows that there is an annual sales of $21,000,000 in the U. S. alone of art ceramic items and that there is no commercially produced Indian pottery of any significance at this time. It proposes that a $100,000 penetration of this market is less than one-half of one percent, and concludes that this is feasible. The study recommends a program of facilities and equipment starting with a 4,940 square foot plant employing 20 people to be expanded to a 10,000 square foot plant employing 129 people, with a corallary ceramics industry to employ another 125 over a ten year program. It proposes a plan of implementation including management, capital, labor, and facility requirements over a ten year period to be financed with an investment of $250,000 and shows that a break-even point is possible by the end of the first full year of operation. (Author)

PB-170 313 **Field 5C, 8F, 13B, 1E**
CFSTI Prices: HC$5.00 MF$1.00
Consoer, Townsend and Associates, Chicago, Ill.
ECONOMIC AND ENGINEERING FEASIBILITY STUDY OF INDUSTRIAL - COMMERCIAL - RESIDENTIAL - RECREATIONAL COMPLEX AT KINGMAN MUNICIPAL AIRPORT MOHAVE COUNTY, ARIZONA.
Final rept.,
by Frederick N. Van Kirk. Feb 66, 191p
Contract C-207-65

Descriptors: (*Economics, Arizona), (*Arizona, Industries), (*Airports, Arizona), (*Industries, Arizona), Commerce, Population, Management planning, Natural resources, Copper, Urban planning, Feasibility studies, Employment, Costs, Civil engineering, Agriculture, Housing, Recreation, Minerals, Labor, Plastics, Electronics, Industrial plants.

Identifiers: Area redevelopment.

A study was made to determine the feasibility of establishing an airport authority at Kingman. The authority would provide and administer facilities and services for the encouragement of aviation of all categories. But of even greater importance, it is expected to provide area and facilities as economically justified for an industrial, commercial, residential and recreational complex within the confines of the proposed authority's land area of 3,600 acres. (Author)

AD-477 398 **See Field 15G**

AD-634 797 **See Field 5D**

AD-635 102 **See Field 5K**

PB-169 878 **See Field 14A**

PB-169 939 **See Field 13B**

PB-169 942 **See Field 13B**

PB-170 344 **See Field 11I**

PB-170 345 **See Field 1C**

PB-170 346 **See Field 17B**

PB-170 347 **See Field 14B**

PB-170 348 **See Field 13D**

PB-170 349 **See Field 6H**

PB-170 350 **See Field 6H**

PB-170 351 **See Field 6E**

PB-170 352 **See Field 6H**

PB-170 353 **See Field 13A**

PB-170 523 **See Field 8I**

5D. HISTORY, LAW, AND POLITICAL SCIENCE

AD-419 474 **Field 5D**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
THE POLITICAL EFFECTS OF MILITARY PROGRAMS: SOME INDICATIONS FROM LATIN AMERICA,
by Charles Wolf Jr. Jun 63, 42p RM-3676-ISA
ARPA Order-189-61

Descriptors: (*Foreign aid, Latin America), (*Political science, Armed forces operations), Government (Foreign), Military strategy.

Identifiers: Military assistance.

It is claimed that such programs tend to be associated with repressive, authoritarian, and dictatorial governments. Several variations of this central theme are discussed. One view, the 'erosion-of-democracy' view, holds that military programs, and in particular military aid programs, tend to increase the threat of overt military takeover, and that military takeover in turn is characterized by dictatorial and repressive government. Another version, the 'support-for-authoritarianism' view, focuses instead on the types of regimes that tend to desire and to require military programs, rather than on the changes in governmental forms and processes that are generated by military programs. This view suggests not that military programs lead toward authoritarian regimes, but that such regimes, however they come into being, tend to generate relatively large demands for military assistance and defense budgets.

AD-634 797 **Field 5D, 5A, 5C**
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
UTILIZATION OF SOCIAL RESEARCH IN SHAPING POLICY DECISIONS,
by P. Kecshemeti. 24 Apr 61, 17p P-2289
Prepared for presentation at AAPOR Meeting, California Univ., Berkeley, 6 May 1961.

Descriptors: (*Social sciences, Management planning), (*Management planning, United States Government), (*Political science, *Decision making), Economics, Law.

The report presents three ways in which scientific theory and research can be used for the purposes of formulating and informing governmental policy. One may be called the 'discipline' approach: experts versed in a discipline draw upon the existing body of knowledge (including recent discoveries) in generating policy-relevant advice. This approach is reflected, as a rule, in the policy application of the older, mature, well-developed sciences, including economics. The second variant of policy utilization of research may be called the 'project' approach: here new scientific knowledge is being acquired with a practical goal in mind. This approach is often the only one available to workers in the less well-developed sciences, including the social sciences other than economics. The third approach is an indirect and informal one. Governmental policy is being influenced, in ways that are hard to specify, by scientific theories and analyses that become part of the general culture and exert an educational influence upon groups and people directly participating in policy-making.

AD-635 092 **Field 5D**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SOME ASPECTS OF FREEDOM: THE COLLEGE, FOREIGN POLICY, AND THE UNITED STATES.
by John R. Boettiger. Jun 66, 28p P-3394
Prepared for presentation at the Annual National Student Leadership Inst. on the United Nations (21st), at Sarah Lawrence Coll., Bronxville, N. Y., 11 Jun 66.

Descriptors: (*Political science, United States), (*Foreign policy, United States), Universities, Students, Theory.

Identifiers: Democracy.

For abstract, see T 66 16.

AD-635 199 **Field 5D**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
TOWARD A FUTURE FOR PLANNING.
Professional paper.
by Marvin Adelson. Jun 66, 19p SP-2022
Prepared for presentation to the Conference of LES FUTURIBLES, Paris (France), Apr 65.

Descriptors: (*Political science, *Decision making), Management planning, Government (Foreign), Social communication, Leadership.

For several reasons, governments will increasingly require a service of studies of the future as an integral part of their planning processes. But governments have always had difficulty in planning, and in dealing adequately with the future. Only part of the problem has been due to limitations in their ability to gather, organize and use information; part of it has been the lack of purposeful future-

orientation; and part has been the inadequacy of verbal communication between 'the man of knowledge' and 'the man of action.' DeJouvenel has proposed and Institute for the Future to help address these Problems. This paper describes some characteristics of such an institute, and its prospective role in improving the processes of decision making and policy construction in government. (Author)

AD-635 236 **Field 5D, 15G**
CFSTI Prices: HC$3.00 MF$1.00
Oklahoma Univ., Norman.
THE UNITED STATES AND VIETNAM: A STUDY IN INTERVENTION.
Master's thesis.
by John E. Fredette. 1966, 166p

Descriptors: (*Foreign policy, United States), (*Vietnam, Foreign aid), Southeast Asia, Political science, Military strategy.

The thesis recounts the historical development of American foreign policy in Vietnam from 1945 until 1960. Primary consideration is given to the political motivation behind the critical decisions made in 1950 and 1954 which were to create the legacy of involvement. In considering the consequences of these decisions, the discussion is limited to that of cause and effect. Little attempt is made to analyze the correctness of the policy followed.

AD-635 289 **Field 5D**
CFSTI Prices: HC$3.00 MF$0.75
RAND Corp., Santa Monica, Calif.
CUBA AND THE SOVIET UNION: THE GROWING ACCOMMODATION.
by Daniel Tretiak. Jul 66, 68p RM-4935-PR
Contract AF 49 (638)-1700

Descriptors: (*Cuba, *Foreign policy), (*USSR, Foreign policy), China, Communism, Political science, Latin America, Economics.

Political and economic differences of opinion between Cuba and the Soviet Union are analyzed within the context of the interrelationships among Cuba, the Soviet Union, and Communist China. From 1961 to 1964 the Cuban attitude toward the Sino-Soviet dispute was one of public noninvolvement. Cuva, nevertheless, looked to Communist China for support of the Cuban doctrine of revolutionary overthrow of Latin American governments, although during this time the Soviet Union was seeking a detente with the United States. Soviet disapproval of the Cuban emphasis on industrialization also caused friction between the two countries. The economic debate was partially settled in early 1965, when Cuba decided to stress agriculture rather than industrialization. Politically, the Cubans have begun to organize their party-state more systematically. They have begun to realize that many of their economic goals cannot be immediately achieved. Like the Soviet Union, they have come to recognize that revolution in Latin America will be a long slow process at best. Their facile optimism has been curbed, at least temporarily, in favor of policies more attuned to political reality in Latin America. (Author)

AD-415 767 **See Field 5C**

AD-477 398 **See Field 15G**

AD-635 102 **See Field 5K**

5E. HUMAN FACTORS ENGINEERING

N66-15810 **Field 5E**
CFSTI Prices: HC$1.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
FACTORS CONTRIBUTING TO THE DELAY IN THE PERCEPTION OF THE OCULOGRAVIC ILLUSION.
by B. Clark, and A. Graybiel. 13 Aug 65, 23p
NSAM-944, Rept. no. 120
Contract NASA Order-R-93
NASA-CR-69562

Descriptors: *Human reaction, *Motion perception, *Rotation, *Visual discrimination recovery.

For abstract, see T 66 16.

AD-635 384 **See Field 17G**

PB-169 931 **See Field 13M**

5F. HUMANITIES

AD-635 265 **Field 5F, 9C**
CFSTI Prices: HC$3.00 MF$0.75
Missouri Univ., Columbia. Dept. of Electrical Engineering.
AN APPROACH TO ELECTRONIC ORGAN DESIGN.
Master's thesis.
by Donald D. Marler. Apr 66, 81p

Descriptors: (*Music, *Electronic equipment), Pipes, Design.

Identifiers: Electronic organs.

Electronic organ sounds have lacked the warmth and beauty of pipes, as reported by Dr. Harvey Fletcher and others. Also, the electronic instruments do not imitate pipe organs sufficiently in sound and operation so that performing artists may be comfortable with, and artistically challenged by them. Therefore, electronic organ design should begin with analysis of pipe organs. Harmonic analysis was performed on the sound produced by a total of thirty-six organ pipes from five stops. Charts show the average harmonic patterns for each stop and the observed standard deviations. The range of harmonic patterns within each stop was not great enough to destroy its stop identity, although many deviations were aurally detectable. This indicates that each note in a synthetic rank need not, and perhaps should not, have an identical tonal structure. Electronic synthesis of the flute and principal harmonic patterns was approximated through waveshaping and a linear combination of simple waveshapes from octave sources. (Author)

PB-170 292 **See Field 5C**

5G. LINGUISTICS

AD-635 202 **Field 5G**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
MATHEMATICAL MODELS OF SYNONYMY.
Professional paper.
by H. P. Edmundson. 14 Jun 66, 21p SP-1976/000/01
Presented at the International Conference on Computational Linguistics (1965), New York, 19-21 May 65.

Descriptors: (*Mathematical models, *Semantics), English language, Computational linguistics, Algebra, Topology.

Identifiers: Words, Synonymy.

An historical summary is made of the concepts of synonymy and antonymy. The roles of part-of-speech and context of a word are considered. The concept of a synonym of a word is shown to require the use of a ternary relation rather than that of a binary relation. Synonymy is defined implicitly, rather than explicitly, by three axioms that lead to equivalence relations that partition the set of content words of a language into equivalence classes. Antonymy is defined implicitly by another set of three axioms. Several algebraic, geometrical, and topological models of synonymy and antonymy are posed and examined. (Author)

AD-635 203 **Field 5G**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
MORE ON UNDERSTANDING UNDERSTANDING UTTERANCES.
Professional paper.
by Paul Ziff. 8 Jun 66, 19p SP-2504

Descriptors: (*Semantics, *English language), Reasoning, Vocabulary, Linguistics, Automata.

Identifiers: Words.

The question as to how hearers are able to understand correctly utterances containing polysemous words can be clarified by considering what would be involved in providing an automation with a comparable ability to resolve polysemy. It is clear that such an automation would have to be able to analyze utterances syntactically and to ascertain whether any of certain standard discourse operators had been applied in the generation of an utterance, e.g., operators corresponding to tropes, nonce usage, etc. But there are a number of other factors that impinge upon the resolution of polysemy. One of these pertains to coherence in discourse, another to matters of general belief. As an approach to dealing with these additional factors, a vectorial analysis of word senses and a new relation of logical implication are proposed. (Author)

AD-635 505 **Field 5G**
CFSTI Prices: HC$4.00 MF$0.75
Linguistics Research Center, Univ. of Texas, Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 11, 1 Nov 65-31 Jan 66.
by W. P. Lehmann, and E. D. Pendergraft. May 66, 121p Rept. no. 27, LRC-66-AMC-27
Contracts DA-36-039-SC-78911, DA-36-039-AMC-02162 (E)
Proj. DA-1PO-20401-A327-03-03
ECOM-02162-11

Descriptors: (*Machine translation, Computers), (*German language, Machine translation), English language, Linguistics, Probability, Chinese language, Russian language.

Generalized programming systems are now in operational use which (a) maintain large stores of linguistic corpora or descriptive data, (b) perform automatic syntactic analysis, synthesis or translation, (c) prepare concordances or linguistic statistics, (d) perform automatic classification, (e) perform coordinate and associative information retrieval, and (f) process informant data. The analysis and classification capabilities are being combined in a self-organizing linguistic system. Descriptive studies of several languages, notably English, German, Russian, Chinese and Japanese, are in progress. Work is continuing in classification theory and algorithms, with applications in time-shared associative retrieval and automatic linguistic classification. (Author)

AD-635 520 **Field 5G**
CFSTI Prices: HC$7.00 MF$1.50
Thomas J. Watson Research Center, Yorktown Heights, N. Y.
SPECIFICATION AND UTILIZATION OF A TRANSFORMATIONAL GRAMMAR.
by D. Lieberman, P. Rosenbaum, D. Lochak, and F. Blair. Mar 66, 305p Scientific-1
Contract AF 19 (628)-5127
Proj. AF-4641
Task 464102
AFCRL-66-270

Descriptors: (*Transformational grammars, Specifications), Grammars, Syntax, English language, Programming languages.

Identifiers: Lexicography.

The report contains four parts: Part I - The IBM Core Grammar of English. Our current grammar of English is presented in full, and numerous derivations are carried out in detail to illustrate the current generative power of the grammar. Part II - Design of a Grammar Tester. The design considerations on which the present version of the tester was based are discussed, and a set of tentative input, output, and control formats are presented. Part III - Programming for the Grammar Tester. A LISP implementation of the grammar tester is presented. The overall flow of control and the various special functions are described. Part IV - Computer Support for Lexicon Development. A program package (programmed in SNOBOL) to facilitate the compilation, modification, scanning, etc. of the lexicon is described. (Author)

PB-170 400 **Field 5G**
CFSTI Prices: HC$2.60 MF$0.50
Pennsylvania Univ., Philadelphia. Dept. of Linguistics.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECT. NO. 60. A PARAPHRASTIC DETERMINATION OF SENTENCE STRUCTURE,
by Peter Fries, and Richard Kittredge. 1965, 25p
Rept. on NSF Transformations Proj. NSF Scientific Documentation Project.

Descriptors: (*Transformational grammars, Analysis), Grammars, Determination.

By considering individual paraphrastic pairs, an attempt was made to draw some conclusions about the structure of a sentence. For each paraphrastic pair, certain segments of the original sentence (which are referred to as the text sentence) appear in both sentences. By considering all possible segments determined by comparison of the text sentence with many of its paraphrases, an attempt was made to find a structural pattern which might reflect the constituent structure of the sentence. (Author)

PB-170 401 **Field 5G**
CFSTI Prices: HC$1.60 MF$0.50
Pennsylvania Univ., Philadelphia. Dept. of Linguistics.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECT. NO. 61. INVESTIGATION OF A STATISTICAL METHOD FOR SEGMENTATION OF SENTENCES,
by Richard Kittredge. 1965, 17p
Rept. on NSF Transformations Proj. NSF Scientific Documentation Project. See also PB-170 400.

Descriptors: (*Grammars, Analysis), (*Transformational grammars, Analysis), Frequency, Phonetics, Statistical processes.

Identifiers: Sentences.

For abstract, see T 66 16.

PB-170 585 **Field 5G**
CFSTI Prices: HC$18.10 MF$1.00
Pennsylvania Univ., Philadelphia. Dept. of Linguistics.
REPORT ON THE STRING ANALYSIS PROGRAMS: INTRODUCTORY VOLUME.
Mar 66, 182p
Pept. on NSF Transformations Project.

Descriptors: (*Computational linguistics, Programming (Computers)), (*Language, Analysis), Programming languages, Dictionaries, Grammars, Syntax, English language, Transformational grammars.

Identifiers: Strings (Linguistics), List processing, Sentences.

The volume describes a program which parses sentences as they appear in scientific texts. Two versions of the program are available, the first written in IPL V, and the second in FAP for the 7094. In the current FAP program, the first analysis of a typical sentence is produced in about 1 second, and the remaining analyses in about 5 seconds. The words of the input sentence are first looked up in a dictionary which gives for each word all its grammatical classifications without reference to the way the word is used in the given article. The program then decomposes each sentence into a very short elementary sentence which is the grammatical center of the input sentence, plus various word-strings (called adjuncts), each of which has a fixed grammatical structure, and adjoins the elementary sentence or another adjunct string within the sentence. The program produces all syntactic analyses of the input sentence, but does not print those analyses which result from a different assignment of an adjunct string in a way that can be predicted from the rules of adjunction. Aside from these permanent predictable ambiguities, a typical sentence has from 1 to 5 analyses. Outputs for consecutive sentences of several short texts are shown. (Author)

AD-635 091 **See Field 5B**

5H. MAN-MACHINE RELATIONS

N66-16394 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
FUNCTIONAL EXTENSION OF THE HUMAN HANDS.
Progress rept. 1 Apr-30 Sep 65.
by W. R. Ferrell, and T. B. Sheridan. 28 Jan 66, 12p SA-9991-4
Grant NsG-107
NASA-CR-69856

Descriptors: *Hand, *Human engineering, *Remote control, *Man-machine system.

N66-16548 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DETERMINATION OF CRITICAL TRACKING TASKS FOR A HUMAN PILOT.
by J. J. Adams, H. P. Bergeron, and J. K. Kincaid. Feb 66, 23p NASA-TN-D-3242

Descriptors: *Compensatory tracking, *Tracking study, *Pilot performance.

N66-16550 **Field 5H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
A SIMULATOR STUDY TO DETERMINE PILOT OPINION OF THE TRIM CHANGES WITH POWER FOR DEFLECTED SLIPSTREAM STOL AIRPLANES.
by F. J. Drinkwater III, AND R. F. Vomaske. Feb 66, 34p NASA-TN-D-3246

Descriptors: *Aircraft performance, *Flight simulation, *Pilot performance, *Aircraft landing, *Stol aircraft.

AD-635 056 **See Field 12B**

AD-635 229 **See Field 9B**

AD-635 475 **See Field 15G**

5I. PERSONNEL SELECTION, TRAINING, AND EVALUATION

AD-462 131 **Field 5I**
CFSTI Price: HC$3.00
RAND Corp., Santa Monica, Calif.
SYSTEMS ANALYSIS AND EDUCATION.
Research memo.,
by J. A. Kershaw, and R. N. McKean. 30 Oct 59, 70p RM-2473-FF

Descriptors: (*Education, Systems engineering), Analysis, Tables, Costs, Statistical analysis, Students, Achievement tests, Psychometrics, Learning.

Identifiers: Systems analysis.

Contents: Explanation of systems analysis; Possibilities of systems analysis in education; Difficulties in the measure of output; Output multi-dimensional; Test scores as measures of one dimension of output; Test scores still multi-dimensional; Estimating incremental output from new systems; Large-scale statistical analysis; Illustrative test-score exhibits; Estimating incremental costs of new systems; Putting cost and output together to compare systems; Illustrative exhibits and selection of preferred system. Interpretation of results; The project of the American Institute for Research (PB-156 264); Recommendations and impressions; Systems analyses in education; Impressions concerning certain policies in education.

AD-634 838 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Personnel Research Activity, San Diego, Calif.
THE RELATIONSHIP OF READING ABILITY TO ACHIEVEMENT IN AN EXPERIMENTAL ELECTRONICS TECHNICIAN SCHOOL.
Research memo.,
by Eugene A. Hooprich. Jun 66, 11p SRM-66-37
Proj. PF017030310

Descriptors: (*Naval training, Electronic technicians), (*Electronic technicians, Selection), (*Reading, Performance tests), Naval personnel, Achievement tests, Aptitude tests, Statistical analysis, Correlation techniques.

An investigation was conducted to determine the relationship between reading ability and achievement in the experimental Electronics Technician (ET) School conducted by the Navy Training Research Laboratory, San Diego. The sample (N=75) consisted of members of five experimental ET School classes trained between September 1964 and May 1966. The experimental training course was oriented toward proficiency in maintenance performance, and trainees were selected from among Navy recruits who had aptitude scores slightly below those required for selection to ET 'A' Schools. The achievement criteria were composite scores (written and performance) based on trainees' scores on all tests administered throughout the course. Product-moment correlations were computed between two reading test scores and the training achievement scores. No statistically significant correlations were obtained. Results indicate that, for technical training courses with orientation and approach similar to the experimental ET School, reading ability within the range of the present sample is not a critical factor in determining success in training. (Author)

AD-635 001 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Cincinnati Univ., Ohio.
AN EXPERIMENTAL COMPARISON OF AN INTRINSICALLY PROGRAMMED TEXT AND A NARRATIVE TEXT.
Final rept., Sep 64-Sep 65.
by R. J. Senter, John S. Abma, Kirk A. Johnson, and Ross L. Morgan. Mar 66, 32p
Contract AF 33 (615)-1046
Proj. AF-1710
Task 171007
AMRL-TR-65-227

Descriptors: (*Programmed instruction, Training devices), Teaching methods, Performance tests, Mathematics, Reading, Performance (Human), Learning, Students, Time studies, Analysis of variance.

Identifiers: Branching tests.

The study compared three methods of instruction in binary and octal arithmetic, i.e., (1) Norman Crowder's branched programed text, The Arithmetic of Computers, (2) another version of this text modified so that subjects could not see the instructional material while answering 'branching' questions, and (3) a narrative text version presenting the same content material. The principal behavioral measure was relative performance on a pre- and posttraining criterion test. The results indicated that prohibiting visual contact with instructional material while answering questions significantly increased the number of erroneous alternatives selected by the subjects, but did not significantly alter the amount of learning manifested nor the time necessary to complete training. The programed instructional methods resulted in significantly greater improvement on the criterion test than was attained by using the narrative text. The instruction was significantly less with the narrative text version of the material. Although, in general, less informational content was imparted with the narrative text, the study time necessary per unit improvement was significantly less with that version. Records were kept of the number of 'wrong answer' branches taken by the subjects receiving instruction via the branched programs. Only about 6% of the total possible 'wrong' branches were actually taken. This suggests that branched programing may be wasteful by virtue of providing a quantity of material that is never studied. (Author)

AD-635 152 **Field 5I**
CFSTI Prices: HC$4.00 MF$0.75
National Academy of Sciences-National Research Council, Washington, D. C. Shipboard Mechanization/Manpower Comm.
SHIPBOARD MANPOWER: A STATISTICAL STUDY OF MEN IN THE U. S. MERCHANT MARINE 1962-1963.
1966, 121p Publication-1410

Descriptors: (*Naval personnel, *Manpower studies), Shipborne, Merchant vessels, Statistical analysis, Personnel management, Automation.

The 'Commercial' seagoing work force of the U. S. merchant marine is likely to encounter shortages in all seven licensed and unlicensed categories shortly because it is characterized by (a) advanced and increasing average age; (b) high net attrition rates, featuring the loss of many of its younger men within the first two years of their entry into the work force; and (c) the difficulty experienced by unskilled unlicensed seamen in obtaining the requisite employment for advancement to the skilled ratings. (Author)

AD-635 213 **Field 5I**
CFSTI Prices: HC$6.00 MF$0.50
System Development Corp., Santa Monica, Calif.
A STUDY OF TWO METHODS FOR ADAPTING SELF-INSTRUCTIONAL MATERIALS TO INDIVIDUAL DIFFERENCES.
Technical memo.
by Ralph J. Melaragno. 22 Jun 66, 53p TM-2932/000/01
Contract N00014-66-C0081

Descriptors: (*Programmed instruction, *Teaching methods), Training devices, Learning, Students, Education, Teaching machines, Tests, Linear systems, Analysis of variance.

Identifiers: Branching tests, Prediction.

The two-phase study compared two methods of adapting self-instructional materials to individual differences among learners; these were compared with each other and with a control condition involving only minimal adaptation. Results of the experiment support three conclusions: (1) training times can be reduced by varying instruction on the basis of learners' abilities; (2) a branching strategy can reduce training time further than either prediction or linear strategies; and (3) when both amount learned and training time are of interest, branching is superior to a linear presentation. (Author)

AD-635 248 **Field 5I, 5A**
CFSTI Prices: HC$1.50 MF$0.75
Texas A and M Univ., College Station.
PROBABILISTIC MANPOWER FORECASTING.
Master's thesis.
by James Fitzhugh Koonce. May 66, 77p

Descriptors: (*Manpower studies, *Management planning), (*Probability, Manpower studies), Mathematical prediction.

Identifiers: Theses.

The use of the methods presented in this report are limited only by the availability of accurate data. Any organization that does not presently employ a system of preparing and using planning data will undoubtably find it difficult to initiate such a data gathering network. However, use of the statistical techniques embodied in this report will provide a manpower planning system that is more up-to-date than most now in use. These methods give realistic planning figures that take into account the likelihood that some projects will not materialize. In addition, many other planning costs, such as hiring and layoff, purchase and salvage, and several types of operating costs, can be derived from such a manpower plan. Additional study in these areas is presently under way by the research group. The major result of using these techniques will be to provide top management with a 'look-ahead' capability that will pin-point real and potential problem areas in budgeting and in large fluctuations in manning. By identifying these problems before they arise, economical and efficient improvements to long range plans can be made early enough to avoid expensive mistakes. By thus preventing or greatly reducing large wastes, the organization will be able to fulfill its mission more economically. In short, this research has developed a powerful tool for management's use. (Author)

AD-635 261 **Field 5I, 5A**
CFSTI Prices: HC$1.50 MF$1.50
Massachusetts Inst. of Tech., Cambridge.
FREEDOM AND CONTROL: THE DILEMMA OF CREATIVITY IN THE ORGANIZATIONAL ENVIRONMENT.
Doctoral thesis.
by Harper Brown Keeler. Jun 66, 271p

Descriptors: (*Creativity, Professional personnel), (*Management control systems, Creativity), Decision making, Leadership, Personnel management, Social communication, Scientific personnel, Government employees, Supervisory personnel, Public health, Laboratories, Perception (Psychology), Motivation, Behavior.

The purpose of this study is the analysis of creativity in the context of organizations found in an advanced modern social system. The report deals with a critique of the literature related to the problems of creativity in organizations. With these criticisms in mind, the second part compares different organizations ranked by levels of creativity. Different factors of the environments (especially those relating to organizational control and feelings of individual freedom) which influence creativity levels are analysed. Eight environments were chosen for study to include industrial labs, government labs, and academic labs. The first case study analyses the severe constraints on creativity which can occur in an organization operated under Public Health regulation. Four labs that exhibit different levels of creativity are compared. Propositions are generated to explain these differences. These propositions are tested in three academic labs which are assumed to have more creative environments. The conclusions include recommendations for altering the theoretical framework offered by the literature, and recommendations for organizations wishing to foster creativity in their participants.

AD-635 304 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
ACADEMIC GRADES IN PRIMARY FLIGHT TRAINING AS PREDICTORS OF FLIGHT SUCCESS.
Special rept.
by Floyd E. Peterson, and Richard S. Pomarolli.
31 Mar 66, 10p SR-66-3

Descriptors: (*Achievement tests, Naval training), (*Naval training, Performance (Human)), Selection, Analysis, Effectiveness, Aviation personnel.

Academic grades received during primary training were evaluated as predictors of success in naval aviation training. It was found that the addition of primary academic grades to the present prediction system resulted in a significant increase in predictive effectiveness. (Author)

AD-635 374 **Field 5I**
CFSTI Prices: HC$4.00 MF$0.75
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
QUALIFICATIONS AND RELATED TRAINING FOR NAVAL RESERVE OFFICERS (1105) NAVAL WARFARE/OPERATIONS, SURFACE.
by C. A. Hart. Jun 66, 103p WRM-66-52
Proj. PF017010201

Descriptors: (*Officer personnel, *Naval training), (*Naval personnel, Military requirements), Warfare, Standards, Job analysis, Shipborne, Naval operations, Engineering.

The memorandum reports on the development of qualifications standards and related training for the four sub-categories (Deck, Operations, Weapons, and Shipboard Engineering) of the Naval Warfare/Operations, Surface area. This phase of the research was limited to Naval Reserve officers designated 1105, not on active duty. These qualifications standards were developed in order that a professional development system could be established. The conclusion reached was that meaningful qualifications standards and related training could be established for each separate sub-category and for each grade from Ensign/Lieutenant Junior Grade through Captain. (Author)

AD-635 382 **Field 5I, 5K**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COMPARISON OF VARIOUS APPROACHES TO TRAINING FOR CULTURE-CONTACT.
Final technical rept., Jul-Dec 65.
by Herbert T. Eachus, Mar 66, 18p AMRL-TR-66-7
Proj. AF-1710
Task 171008

Descriptors: (*Military training, *Culture), Training devices, Counterinsurgency, Behavior, Social communication, Military personnel, Instructors, Verbal behavior, Perception (Psychology), Language, Social sciences.

Identifiers: Military assistance, Cross culture (Sociology), COIN.

A comparative analysis of several approaches to training interaction skills for culture-contact was conducted. In addition, the range of American overseas work by the Air Force and other Government agencies was delineated with discussions of the type of training most required in different areas of involvement. Two major opposing scientific conceptualizations of training for culture-contact are discussed. The objectives of cross-cultural interaction skill training are presented with consideration of self-confrontation as a training technique. (Author)

AD-634 985 See Field 1D

AD-635 132 See Field 5B

AD-635 194 See Field 5A

AD-635 384 See Field 17G

AD-635 475 See Field 15G

AD-635 501 See Field 15C

AD-635 502 See Field 15C

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-430 226 **Field 5J**
CFSTI Price: HC$1.60
Army Medical Research Lab., Fort Knox, Ky.
PERFORMANCE DECREMENT IN VEHICLE DRIVING,
by Marvin J. Herbert, and William E. Jaynes. 12 Nov 63, 16p Rept. no. 597
Proj. DA-3A012001B801
Task 01
Prepared in cooperation with Municipal Univ. of Omaha, Nebraska.

Descriptors: (*Motor vehicle operators, Performance (Human)), (*Fatigue (Physiology), Motor vehicle operators), Performance tests, Effectiveness.

One hundred and eighty subjects were allocated to five groups on the basis of the number of hours the members of each group drove a truck on a fatigue course after an initial test, and prior to a retest on a battery of nine driving tests. The fatigue periods were of 0, 1, 3, 7 or 9 hours duration. After determining the initial equivalency of the groups by an analysis of pre-test results, post-fatigue test scores were correlated with hours of fatigue driving. All 15 test scores yielded part correlations significant at the 5% level of confidence or better. Correlations reached a maximum of r = .50. A decrement functions was presented which showed progressive loss in performance through seven hours of driving. (Author)

AD-470 442 **Field 5J, 12A**
CFSTI Prices: HC$3.60 MF$0.50
Army Medical Research Lab., Fort Knox, Ky. Div. of Psychology.
AN ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS,
by James N. Cronholm. 15 Apr 65, 35p
Proj. DA-3A014501B74C
Tasks 01, 02
USAMRL-625

Descriptors: (*Analysis of variance, Psychometrics), (*Psychometrics, Statistical analysis), Sampling, Probability, Correlation techniques, Reliability.

The purpose of the paper is to describe a method of analyzing pairwise agreements and disagreements among nominally scaled observations into within and between group components. Expected values, biases, sampling variances, and covariances of the components of agreement are derived for the special case of two groups. A general method of obtaining exact joint, conditional, and marginal sampling probabilities of the components is described, and several large sample criteria are discussed. The proposed method of agreement and disagreement analysis should prove useful as a means of describing the results of experiments and assessing statistical hypotheses. (Author)

AD-634 784 **Field 5J, 6P**
CFSTI Prices: HC$6.00 MF$1.25
Indiana Univ., Bloomington.
MUSCULAR AND CIRCULATORY RESPONSES: THEIR SENSITIVITY ASSESSED IN A SIGNAL DETECTION SITUATION.
Doctoral thesis (Technical),
by Kolbjorn B. Kveim. Apr 66, 214p TR-11
Contract Nonr-908 (15)

Descriptors: (*Auditory perception, Psychophysiology), (*Auditory signals, Reaction (Psychology)), (*Electrophysiology, Auditory perception), Stimulation, Thresholds (Physiology), Sensitivity, Behavior, Motor reactions, Muscles, Autonomic nervous system, Galvanic skin response, Electroencephalography, Electrocardiography, Cardiovascular system, Heart, Pulse rate, Arms, Audiometry, Head, Psychoacoustics, Verbal behavior.

Identifiers: Electromyography.

In this first attempt to employ signal detection methodology in the assessment of the absolute sensitivity of somatic response systems, four muscular and four circulatory variables were studied: EMG potentials from the forearms, neck, and jaw; amplitude of R-wave in EKG, heart cycle time, digital volume pulse, and finger volume. The somatic responses were recorded continuously while four subjects engaged in a typical auditory detection task. The somatic activity was assessed both before and after each observation interval. Readings of the integrated EMG potentials were obtained for each of four seconds, while the circulatory variables were measured on each of 15 heart beats. Two basic analyses were performed within each variable: (a) the activity on Signal and Noise trials was compared in order to establish whether, and at what time, systematic 'signal effects' occurred; (b) the difference in activity on S and N trials under one signal energy was compared to the difference under the other to locate possible 'energy effects'. Both analyses were performed within the individual data as well as in the total data for all subjects. (Author)

AD-634 880 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
York Univ., Toronto (Ontario). Dept. of Psychology.
CONFERENCE ON PSYCHOLOGICAL STRESS.
Final rept.
by M. H. Appley. Jun 66, 10p
Contract Nonr-4612 (00)
Proj. NR-171-239

Descriptors: (*Stress (Psychology), Symposia), Psychophysiology, Emotions, Central nervous system, Personality, Social psychology, Culture.

The report consists of a list of the conference participants and a list of paper presented.

AD-634 997 **Field 5J, 15C, 9B, 5K K**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Agricultural and Home Economic Experiment Station, Ames. Dept. of Sociology and Anthropology.
ANNOTATED BIBLIOGRAPHY ON SIMULATION IN THE SOCIAL SCIENCES.
by John J. Hartman. 1966, 35p Rural Sociology-53
Contract OCD-PS-65-9

Descriptors: (*Simulation, Bibliographies), (*Social sciences, Simulation), Abstracts, Civil defense systems, Social psychology, Sociology, Computers, Game theory, Mathematical analysis, Man-machine systems.

Approximately 74 references are included in the bibliography.

AD-635 008 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park. Dept. of Psychology.
INVOLVEMENT AND SOURCE CREDIBILITY AS VARIABLES IN PERSUASION WITH JAPANESE STUDENTS.
Technical rept.
by Elliott McGinnies. May 66, 73p TR-9
Contract Nonr-595 (21)
Proj. NR-171-250

Descriptors: (*Social communication, Effectiveness), (*Culture, Social communication), Reaction (Psychology), Japan, Sources, Attitudes, Psychometrics.

Identifiers: Persuasive communications.

Samples of students at five universities in the Tokyo area read an article written by Ambassador Reischauer defending the military position taken by the United States in Vietnam. Credibility of the source was manipulated by attributing the article either to Mr. Reischauer or to a MAAG advisor recently returned from Vietnam. Attitudes of the students were measured immediately after they had read the article and compared with those of control subjects who had not been exposed to a communication. Involvement of the subject with the issue as well as their impressions of the author were also measured by means of rating scales and adjective check list. Source credibility, in general, was a factor in attitude change only as it interacted with involvement. The trend was one in which high involvement with the issue was associated with resistance to persuasion. The less involved subjects, as compared with those who were more involved, showed relatively greater susceptibility to persuasion when presented with the more highly credible source. Involvement among the subjects as a group was greatest at the extremes of the attitude continuum and minimal at the neutral point of the scale. (Author)

AD-635 024 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Beaver Coll., Glenside, Pa.
SITUATIONAL AND PERSONAL FACTORS IN SOCIAL INTERACTION.
Annual rept. no. 1.
by Bernard Mausner. Jun 66, 21p
Grant Nonr (G)-0006-65
Proj. NR-171-456

Descriptors: (*Social psychology, Reaction (Psychology)), (*Perception (Psychology), Psychometrics), Personality, Leadership.

The report summarizes briefly the results of five empirical investigations in determinants of social interaction in perceptual judgment and of a large-scale reanalysis of data from previous studies. The major findings are (1) the use of judgments of numerosity of dots in studies of social influence on perception is unwise since a perceptual illusion makes it difficult for subjects to accept influence uniformly through a wide range of stimuli; (2) subjects who are 'socially marginal', or have high scores on Rokeach's test of 'dogmatism' or who are college students with a low level of involvement in extracurricular activities attend to intra-psychic cues as determinants of social interaction whereas subjects who are not 'socially marginal', or who have low scores on the test of dogmatism or who are campus leaders tend to respond to situational cues. (Author)

AD-635 205 **Field 5J, 6S**
CFSTI Prices: HC$3.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
SOME SECONDARY DETERMINERS OF PSYCHOLOGICAL STRESS.
by Patrick M. Curran, and Robert J. Wherry Jr.
12 May 66, 21p NAMI-963
NAVMED-MF022.03.02-5013.3

Descriptors: (*Stress (Psychology), *Aviation personnel), Performance (Human), Perception (Psychology), Reaction (Psychology), Reflexes, Time studies, Measurement, Analysis of variance, Aviation medicine.

The study employed a four-choice, color discrimination task and electric shock in a simulated air-

craft flight over hostile country to investigate certain secondary determiners of anticipatory physical threat stress which are presumed to be components of the perceived proximity of the unpleasant event. The findings suggest that the three secondary determiners of anticipatory physical threat stress investigated (perceived time since the situation started, perceived time until the event occurs if it occurs, and time elapsed since the initial warning of the possible event occurrence) are significant components of the perceived proximity of the unpleasant event, and that they interact in a complex manner. Further research is suggested to determine the nature of the interaction of these components over-time. A measure was devised which is considered to reflect differences in individual susceptibility to anticipatory physical threat stress. (Author)

AD-635 277 **Field 5J**
CFSTI Prices: HC$4.00 MF$1.00
Texas Univ., Austin.
THE DEVELOPMENT OF TIME ESTIMATION IN CHILDREN.
Doctoral thesis.
by John Breeskin. Aug 66, 141p

Descriptors: (*Time, *Perception (Psychology)), (*Children, Perception (Psychology)), Psychometrics, Anxiety, Intelligence tests, Projective techniques, Personality, Sex, Aging (Physiology), Statistical analysis.

The development of time perception in children from 7.7 to 14.7 years of age was studied, using three years of preliminary data from an ongoing six-year longitudinal study, the Holtzman Research Project, designed to study cognitive and perceptual development in children. Three 'spliced together' longitudinal groups of subjects were used, with repeated measurements obtained two or three times at one-year intervals. The Time Estimation Task, a verbally-produced estimate of an empty objective 60-second interval, was obtained three times within each yearly testing session from a large group of children of both sexes in the public schools of Austin, Texas. Specific hypotheses as to the relationship between time estimation and the subject's age, possible sex difference in time estimation, serial position effects in repeated temporal estimates, and the reliability of time estimates were examined. In addition,the relationships between time estimation and related Holtzman Inkblot Technique (HIT) variables, the Wechsler Intelligence Scale for Children subtests, Sarason Test Anxiety Scale for Children scores, and Parental Occupation Scale items were examined. (Author)

AD-635 292 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Rochester Univ., N. Y. Dept. of Psychology.
ON THE MEASUREMENT OF MOOD.
Technical rept.
by Russel F. Green. Aug 65, 26p TR-10
Contract Nonr-668 (12)
Proj. NR-171 342

Descriptors: (*Emotions, Psychometrics), Measurement, Behavior, Factor analysis, Vocabulary, Correlation techniques.

Identifiers: Mood (Psychology).

The report includes the following: usual and proposed definitions of the terms feeling, emotion, and mood; processes and methods used and problems faced in attempting to define and organize mood scales; a series of uses to which the scales have been put; a series of correlations of the scales with widely known temperament scales; and work concerning social desirability and faking.

AD-635 294 **Field 5J**
CFSTI Prices: HC$5.00 MF$1.00
Rochester Univ., N. Y. Dept. of Psychology.
FACTOR ANALYTIC STUDIES OF THE MOOD ADJECTIVE CHECKLIST.
Technical rept.
by Vincent Nowlis, and Russel F. Green. Aug 65, 165p TR-11
Contract Nonr-668 (12)
Proj. NR-171-342
Rept. on Research Program on Mood and Attitude Change.

Descriptors: (*Emotions, Psychometrics), Factor analysis, Syntax, Vocabulary, Behavior.

Identifiers: Adjectives, Mood (Psychology).

A mood adjective check list (MACL) was administered to approximately 450 college men at the beginning and end of six weekly one-hour experimental sessions, during which a motion picture film or other treatment was used to induce different mood states. The check list consisted of 130 words carefully chosen to represent four hypotheses about the dimensions of mood. Five different sets of results were factor analyzed and a total of 12 factors were identified, eight of which appeared in at least four of the five rotated solutions. Each factor is discussed as a basis for further hypotheses about the dimensions of mood. To determine whether or not responses to the adjectives of any single factor covary with different experimental treatments, pre-post difference scores were computed for each of the experimental sessions for the 49 words which best define the 12 factors. Of the 294 difference scores only 17 show inconsistency with other scores for variables in the same cluster.

AD-635 460 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Rochester Univ., N. Y. Dept. of Psychology.
DEVELOPMENT OF A MOOD ADJECTIVE CHECK LIST (MACL).
Final rept.
by Vincent Nowlis. Jan 66, 6p
Contract Nonr-668 (12)
Proj. NR-171-342

Descriptors: (*Emotions, Psychometrics), Factor analysis, Stress (Psychology), Sleep, Personality, Vocabulary, Syntax.

Identifiers: Mood (Psychology), Adjectives.

A Mood Adjective Check List (MACL) was developed on the basis of factor analytic methods, which yielded twelve hypothetical dimensions of mood. Mood scores and changes in mood score were studied in relation to such environmental and psychological features as stressful motion picture films and communications, examinations, other films, social isolation, amount and quality of sleep, temperament traits, and sex differences. The usefulness and limitations of the MACL and of the concept of mood are discussed. (Author)

AD-635 491 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
San Jose State Coll., Calif.
A REVIEW OF EFFORTS TO ORGANIZE INFORMATION ABOUT HUMAN LEARNING, TRANSFER, AND RETENTION.
Final rept. Jul-Nov 65.
by Rose Ginsberg, John C. McCullers, John J. Meryman, Calvin W. Thomson, and Robert S. Witte. Mar 66, 42p
Contract AF 33 (615)-2951
Proj. AF-7907
Task 790701
AMRL-TR-66-23

Descriptors: (*Learning, Data), (*Transfer of training, Data), (*Retention, Data), Analysis of variance, Psychometrics, Reviews, Job analysis.

Efforts pertaining to organizing available information on human learning, transfer, and retention are summarized and evaluated on six criteria: behavioral significance of categories, scope, objectivity and reliability of categories, prognosis for the system, logical structure, the heuristic vale of the system. Attention is also given to several other sources of guidance for organizing information on human learning. The review indicates at least six major approaches to a taxonomy of human learning. The bases for these different approaches are: (1) general or limited theoretical factors, (2) conditions of learning including the learner, (3) individual differences, (4) physical characteristics of learning tasks, (5) task characteristics in relation to empirical variables, and (6) task characteristics in relation to learning principles. In some cases the approaches are combined. The major conclusion is that although some contributions have been made to a gneral organization of information on human learning, intense and detailed efforts toward a comprehensive taxonomy are only in a preliminary formative phase. (Author)

PB-169 621 **Field 5J**
CFSTI Prices: HC$10.60 MF$0.75
Institute for Defense Analysis, Arlington, Va. Economic and Political Studies Div.
ON COGNITIVE BALANCE.
by Nehemiah Jordan. Feb 66, 104p RP-P-178, IDA/HQ-65-3591

Descriptors: (*Perception (Psychology), Theory), Psychometrics, Behavior, Reasoning.

Identifiers: Cognition.

Four experiments on cognitive balance are presented. The data they yielded and some of their implications are discussed in detail.

AD-634 998 **See Field 13M**

AD-635 488 **See Field 9D**

AD-635 501 **See Field 15C**

AD-635 502 **See Field 15C**

5K. SOCIOLOGY

AD-635 102 **Field 5K, 5D, 5C**
CFSTI Price: MF$2.50
American Univ., Washington, D. C. Foreign Areas Studies Div.
AREA HANDBOOK FOR PAKISTAN.
by Frederica Muhlenberg, Frances Chadwick Rintz, Rinn-Sup Shinn, Harvey H. Smith, and M. B. Thresher. Oct 65, 618p DA-Pam-550-48

Descriptors: (*Pakistan, Handbooks), Sociology, Political science, Economics, Government (Foreign), History, Geography, Culture, Language, Religion, Education, Public health, Attitudes, Industries, Agriculture, Labor, Banking, Commerce, Armed forces (Foreign).

For abstract, see T 66 16.

AD-635 150 **Field 5K, 15C**
CFSTI Prices: HC$3.00 MF$0.75
Pittsburgh Univ., Pa. Dept. of Sociology.
IMPACT OF THE CUBAN MISSILE CRISIS. PATTERNS OF PUBLIC RESPONSE.
by Robert H. Mast. Feb 66, 85p
Contract OCD-PS-64-61
Task 48-21-C

Descriptors: (*Cold war, Public opinion), (*Civil defense systems, Public opinion), Attitudes, Population, United States, Cuba, Response, Reaction (Psychology), Perception (Psychology), Nuclear warfare, Decision making, Fallout shelters, Disarmament, Anxiety, Behavior, Sociology, Statistical data.

The report examines the impact of a critical event on the American public and attempts to assess the substance and dynamic of the public's response to the resulting crisis situation with special emphasis on responses associated with civil defense measures. The event involved was the Cuban mis-

sile crisis of 1962 which produced a period of severe international tension. In a 1963 sample, Americans were asked if they had engaged in any of six crisis related activities during the Cuban crisis. These activities comprised efforts to respond in some meaningful fashion to the threat posed by the crisis. Patterns of response were examined, both for overall distributions among the six activities and for paired sets of activities. Individuals in the sample were classified by their degree of participation in the various activities. Those who had engaged in 'Any Activity' were compared with those who had not, and those who had engaged in each of the six separate activities were compared with each other, the sub-totals and the fifteen sets of paired activities as well. These comparisons were made with regard to personal characteristics that served to locate individuals in the overall social structure and also with regard to personal attitudes deemed to be of relevance for crisis response. Differences in crisis response were found and they established summary patterns that are of theoretical interest. (Author)

AD-634 997 See Field 5J

AD-634 998 See Field 13M

AD-635 382 See Field 5I

PB-170 266 See Field 5C

PB-170 306 See Field 5C

6A. BIOCHEMISTRY

AD-634 835 **Field 6A, 8A**
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
SODIUM TRANSPORT IN ULVA,
by Joseph T. Cummins, John A. Strand, and Burton E. Vaughan. 15 Jul 66, 19p USNRDL-TR-1016
Proj. SR-011-01-01
Task 0401

Descriptors: (*Marine biology, Photosynthesis), (*Photosynthesis, *Algae), Sodium, Transport properties, Permeability, Tracer studies, Radioactive isotopes, Formaldehyde, Cardiac glycosides, Nitrophenols, Ions, Cholines, Sucrose, Ion exchange, Inhibition.

Identifiers: Ion transport.

The transport of sodium through the marine algae Ulva lobata and Ulva expansa has been studied by a tracer analytical method. Sodium was transported across Ulva at a rate of 0.15%/min in the dark; this rate was slowed by ouabain and increased by formaldehyde. Dinitrophenol DCMU, and ammonium ion had no effect on the dark rate. Light caused a transient, rapid light extrusion of sodium from the algae equal to approximately twice the amount of sodium expected during a two minute dark period. All the inhibitors adversely affected the efflux of sodium due to light. Comparison of the ability of choline and sucrose to elute sodium from Ulva showed that a high portion of the sodium can be released, but only by a process similar to ion exchange. (Author)

AD-634 836 **Field 6A, 6P, 6O**
CFSTI Prices: HC$2.00 MF$0.50
Keio Univ. (Japan). School of Medicine.
AUTOMATIC RECORDING OF PO2, PH, Na AND K IN THE BLOOD AND THE BRAIN.
Final rept., 15 Mar 65-14 Mar 66,
by Toyozo Aizawa. Jun 66, 50p Rept. no. J-213-6
Contract DA-92-557-FEC-37972
Proj. DA-2N014501B71D
Task 00-019FE
See also AD-438 200.

Descriptors: (*Brain, Metabolism), (*Blood circulation, Brain), (*Electrolytes (Physiology), Brain), Cerebral cortex, Convulsive disorders, Electroencephalography, Heart, Central nervous system, Sodium, Potassium, Ions, Recording systems, Respiration, CNS stimulants, Blood pressure, Cats, Japan.

Identifiers: Aminophylline, Dimorpholamine, Nikethamide, Vitacampher, Lobeline.

The effect of intravenous administration of concentrated Na and K solutions, and cardiorespiratory stimulants on cerebral circulation, metabolism and electrical activity were investigated in cats. (1) Effect of concentrated cation solutions: (a) Increased Na (+) in the extracellular fluids of the brain induced the electrical and metabolic activation and increase in cerebral blood flow. Electroencephalogram showed the seizure or low voltage fast activity. Cerebral blood flow increased, brain PO2 and PCO2 increased, pH decreased, Na (+) usually increased and when seizure started Na (+) changed to decrease. (b) Intravenous administration of concentrated K solution resulted in the cardiac dysfunction and consequently showed a decrease in cerebral blood flow and metabolism, and electrical depression. After intracisternal administration of concentrated K solution, it appeared to show the metabolic and electrical activation. However, since there is a question about increase in concentration of K + in the brain surface after intracisternal administration of K, further investigation with more appropriate method is necessary for obtaining the direct action of K + on the brain. (2) Effect of intravenous administration of cardiorespiratory stimulants of aminophylline, dimorpholamine, nikethamide, vitacampher and lobeline were investigated. (Author)

AD-634 864 **Field 6A, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Harvard Univ., Cambridge, Mass. Dept. of Statistics.
SEQUENTIAL EXPERIMENTS IN BIOASSAY.
Technical rept.,
by Miles Davis. 30 Apr 65, 48p TR-5
Contract Nonr-1866 (37), Grant NIH-FR-00004
Proj. NR-042-097

Descriptors: (*Sequential analysis, *Biological assay), Experimental design, Lethal dosage, Factor analysis.

Five sequential and two non-sequential designs for estimating the median lethal dose m in the biological assay problem when quantal responses are studied and compared. Three versions of the stochastic approximation process of Robbins and Monro (1951) and two versions of the up-and-down method of Brownlee, Hodges and Rosenblatt (1953) are compared with non-sequential designs using minimum transform chi-square estimates of Berkson (1956) and Spearman-Karber estimates described by Cornfield and Mantel (1950). Exact mean square errors of the estimate of m are computed for several initial doses, step sizes, arrangements of animals in trials and forms of assumed dose-response curves. The sequential designs appear to have smaller mean square error than the non-sequential ones under almost all conditions. If the experimenter is sure that he knows m within 3 sigma, all the sequential designs perform approximately equally well. If he is less certain of m, the delayed Robbins-Monro process of Cochran and Davis (1965) or the delayed up-and-down method are clearly more accurate than the others. (Author)

AD-635 207 **Field 6A**
CFSTI Prices: HC$2.00 MF$0.50
Instituto Nacional de Tecnologia, Rio de Janeiro (Brazil).
THE EFFECT OF FENTON'S REAGENT ON TRYPSIN AND RIBONUCLEASE.
Final rept. no. 2, 1 Jun 65-31 May 66,
by J. C. Perrone. Jun 66, 38p
Grants DA-ARO-49-092-65-G82, DA-ARO-49-092-64-G49
Proj. DA-2N014501B71D-00-008-LA

Descriptors: (*Trypsin, Enzyme inhibitors), (*Ribonuclease, Ezyme inhibitors), (*Enzyme inhibitors, Reaction kinetics), Electrophoresis, Chromatographic analysis, Amino acids, Radiation effects, Copper, Decomposition, Thermal stability, Hydrogen peroxide, Brazil.

Identifiers: Fenton's reagent.

The inactivation of trypsin by Fenton's reagent is very fast during the first few minutes of reaction: in the first three minutes of reaction about 50% of the activity is lost. However, the inactivation after this initial reaction period is much slower. Fractionation of the reaction mixture shows the presence of two main components: a fast fraction with little activity and a slower and more active fraction. Several authors have published experiments showing that partially damaged molecules are formed during the irradiation of proteins. It was possible to demonstrate that this is also true for trypsin treated with Fenton's reagent. Furthermore, trypsin after suffering this double treatment showed marked changes in its enzymatic characteristics. Cu (++) was found to have a marked influence on the inactivation of ribonuclease by Fenton's reagent.

N66-16020 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Instrumentation Research Lab.
FLUORMETRIC ASSAY FOR NUCLEASE ACTIVITY.
by V. L. Stevens. 26 Jul 65, 15p IRL-1029
Grant NsG-81-60
NASA-CR-69662

Descriptors: *Deoxyribonucleic acid (DNA), *Enzyme activity, *Fluoro compound, *Chemical reaction, *Quantitative analysis.

For abstract, see T 66 16.

AD-635 032 See Field 7D

AD-635 111 See Field 6T

6B. BIOENGINEERING

PB-169 825 See Field 9B

6C. BIOLOGY

AD-469 666 **Field 6C, 6F**
CFSTI Prices: HC$28.10 MF$1.50
Oklahoma Univ. Research Inst., Norman.
ALASKAN HEMATOPHAGOUS INSECTS, THEIR FEEDING HABITS AND POTENTIAL AS VECTORS OF PATHOGENIC ORGANISMS. I: THE SIPHONAPTERA OF ALASKA.
Final technical rept. pt. 1, Jun 60-May 64,
by Cluff E. Hopla. May 65, 285p
Contract AF 41 (657)-333
Proj. AF-8241
Task 824101
AAL-TR-64-12-Vol-1

Descriptors: (*Insects, Alaska), (*Siphonaptera, Alaska), (*Disease vectors, Siphonaptera), (*Alaska, Insects), Ecology, Paleontology, Morphology (Biology), Classification, Life cycle, Distribution, Parasites, Blood, Ingestion (Physiology), Arctic regions.

CONTENTS: Climate and geography; Paleozoology; Morphology; Collection and Preparation of Fleas for Study; Taxonomy; Pulicidae; Hystrichopsyllidae; Ischnopsyllidae; Leptopsyllidae; Ceratophyllidae; Genus Ceratophyllus; Genera Dasypsyllus, Mioctenopsylla, Malareus and Megabothris; Genera Monopsyllus, Orchopeas, Opisodasys, Tarsopsylla, Oropsylla, Thrassis and Amphalius; Vermipsyllidae; Life history; Distribution of Alaskan fleas; Origin of Alaskan fleas; Host associations; Medical importance of Alaskan Siphonaptera.

AD-469 673 **Field 6C, 6F**
CFSTI Prices: HC$9.60 MF$0.75
Oklahoma Univ., Norman. Research Inst.
ALASKAN HEMATOPHAGOUS INSECTS, THEIR FEEDING HABITS AND POTENTIAL AS VECTORS OF PATHOGENIC ORGANISMS. II. THE FEEDING HABITS AND COLONIZATION OF SUBARCTIC MOSQUITOES.
Final rept., pt. 2.
by Cluff E. Hopla. Jul 65, 99p
Contract AF 41 (657)-333
Proj. AF-8241
Task 824101
AAL-TR-64-12-Vol-2
See also AD-469 666.

Descriptors: (*Insects, Alaska), (*Culicidae, Alaska), (*Alaska, Insects), (*Disease vectors, Culicidae), Ecology, Life cycle, Blood, Ingestion (Physiology), Distribution, Arthropods, Arctic regions, Bibliographies.

CONTENTS: Climate and geography; Life cycle; Biting studies; Colonization of subarctic mosquitoes; Observations of the biology of Culiseta alaskaensis; Zoonotic relationships; Check list of Alaskan hematophagous arthropods; Bibliography of cold-hardiness in insects.

AD-635 178 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Zoology.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE. VOLUME V. NUMBER 6.
by George Anastos. 1966, 13p
Contract DA-49-193-MD-2238

Descriptors: (*Disease vectors, Indexes), (*Insects, Disease vectors), Ticks, Diptera, Mites, Siphonaptera, Lice, Arthropods, Insect control, Virus diseases, Protozoa, Bacteria, Spirochaeta, Rickettsia, Diseases, USSR, Eastern Europe, China.

For abstract, see T 66 16.

AD-635 342 **Field 6C**
CFSTI Prices: HC$3.00 MF$0.50
Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PHYSIOLOGICAL OBSERVATIONS ON SUBARCTIC BEARS UNDER WINTER DEN CONDITIONS.
Technical rept., Nov 64-Mar 65.
by G. Edgar Folk Jr, Richard C. Simmonds, and Mary A. Folk. Mar 66, 19p AAL-TR-65-15
Proj. AF-8237
Task 823702

Descriptors: (*Mammals, *Hibernation), Hypothermia, Body temperature, Electrocardiography, Urine, Excretion, Pulse rate, Periodic variations, Arctic regions.

Identifiers: Bears, Heart rate.

Heart rates, body temperature, and urinary output were studied in a variety of activity states in one or all of a group of four bears (two grizzly bears, Ursus horribilis, and two black bears, Ursus americanus Pallas). In addition, the cardiac activity of three black bears was studied during whole body hypothermia. The resting heart rates obtained during winter dormancy from three bears were significantly lower (75-91%) than those obtained during the summer. The physiological activity cycle of the dormant bears did not change appreciably as they continued to show a relatively high heart rate (40 beats/minute) in the morning hours. Body temperatures obtained from one black bear during winter dormancy showed only a 4C depression. One dormant bear did not urinate for at least three months, and it was not until the third day post-arousal that voiding occurred. The three black bears subjected to whole body hypothermia experienced asystole and cardiac arrest at body temperatures of 16 - 21C. At the time of cardiac arrest, heart rates as low as 1 beat/minute were recorded, indicating that bears could maintain low hypothermic heart rates. (Author)

N66-16566 **Field 6C**
CFSTI Price: MF$1.75
National Aeronautics and Space Administration, Washington, D. C.
EXTRATERRESTRIAL LIFE. A BIBLIOGRAPHY. PART II. PUBLISHED LITERATURE, 1900-1964.
Dec 65, 345p NASA-Sp-7015-Part-2
Available from Superintendent of Documents, GPO, Washington, D. C. 20402, HC$0.75.

Descriptors: *Bibliography, *Extraterrestrial life.

For abstract, see T 66 16.

PB-170 802 **Field 6C**
CFSTI Prices: HC$6.00 MF$0.75
Hughes Research Labs., Malibu, Calif.
ON THE AUTOMATIC COMPARISON OF FINGER RIDGE PATTERNS FOR PERSONAL-IDENTITY VERIFICATION.
Research rept. (rev. ed.).
by Mitchell Trauring. Apr 63, 94p RR-190
Revision of manuscript submitted Mar 61, NSF Scientific Documentation Project.

Descriptors: (*Hands, Identification), Pattern recognition, Automatic.

Identifiers: Fingerprints.

Potential systems for verification of personal identity which are based on finger ridge pattern comparison are discussed. Methods, devices, and systems for personal-identity verification are described -- some for the first time. The characteristics of the methods and the requirements and feasibility of the systems are analyzed, and initial research and development steps outlined. The discussed systems range widely in their observation, communication, and information-handling requirements, and also in their vulnerabilities to individual finger ridge pattern size and shape changes. The systems which appear superior in their requirements and vulnerabilities are based on ideas and devices which are believed to be novel. Such systems can have application to commercial credit, industrial security, locks, etc. (Author)

AD-635 307 See Field 6F

6D. BIONICS

AD-634 894 **Field 6D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
CONFERENCE ON NEUROCYBERNETICS OF THE SCHOOLS OF HIGHER EDUCATION (2nd),
by V. N. Pushkin. 9 May 66, 15p LT-66-13
TT-66-61615
Trans. of Voprosy Psikhologii (USSR) n1 p181-5 1966.

Descriptors: (*Cybernetics, Symposia), Neurology, Brain, Bionics, Physiology, Probability, Pattern recognition, USSR.

Papers presented at the conference are briefly summarized.

AD-635 391 **Field 6D**
CFSTI Prices: HC$4.00 MF$1.00
Melpar, Inc., Falls Church, Va.
ELECTRONIC SIMULATION OF THE DYNAMICS OF EVOLVING BIOLOGICAL SYSTEMS.
Final technical rept.
by Keith E. Justice, Edward M. Connelly, and Judy M. Gervinski. May 66, 127p
Contract AF 33 (615)-2456
Proj. AF-4160
Task 416004
AFAL-TR-66-151

Descriptors: (*Bionics, Genetics), (*Genetics, Mathematical models), Physiology, Simulation, Adaptation (Physiology), Monte Carlo method, Survival, Reproduction (Physiology), Mutations, Digital computers, Analog systems, Optimization, Probability, Mice.

A bionic investigation and modeling of organic evolution is described. The project was undertaken to provide a deeper understanding of the adaptive processes involved in organic evolution. Of particular interest was a comparison of self-organizing processes in evolutionary systems and analogous processes in trainable logical networks. The biological prototype for the model is the feral house mouse (Mus musculus) as it exists in semi-isolated populations in the southwestern United States. Special emphasis is given to a balanced lethal genetic system known to exist in the species. Using Monte Carlo techniques, the model simulates, for each individual, such events as the probability of survival, migration, mating, reproduction, mutation, genetic segregation, and natural selection. Implementation of the model on a digital computer is described. Results of experiments performed with the model show that the model behaves in a manner highly analogous to both the biological prototype and to certain aspects of trainable logical networks. Implications and theoretical investigations of the work for future developments in machine intelligence are discussed. (Author)

PB-169 825 See Field 9B

6E. CLINICAL MEDICINE

AD-634 885 **Field 6E**
CFSTI Prices: HC$2.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
A STANDARD TECHNIQUE FOR TEMPORAL BONE PREPARATION,
by Makoto Igarashi. 2 Mar 66, 50p Monograph-13
NASA Order-R-93

Descriptors: (*Ear, Histological techniques), (*Bone, *Histological techniques), Morphology (Biology), Dehydration, Biological stains, Photomicrography, Laboratory equipment, Laboratory animals.

Identifiers: Decalcification.

The inner ear end organs are structurally fragile with the membranous labyrinth weakly supported within the bony labyrinth. The technique of histological preparation must be directed toward preserving the anatomical relationship of the inner ear structures and minimizing post-mortem changes. The densely ossified petrous portion of the temporal bone must be decalcified and the inner ear spaces uniformly infiltrated with celloidin, all the while maintaining the histological integrity of the membranous labyrinth. This monograph is intended as a guide in the preparation of good temporal bone slides which will make it possilbe to investigate the correlation between end organ functions and morphological findings. No fundamental histological information is included, however, as that appears in other publications. The techniques described herein have been found to render the most consistently satisfactory temporal bone preparations. (Author)

AD-634 942 **Field 6E**
CFSTI Prices: HC$5.00 MF$1.00
Army Biological Labs., Frederick, Md.
IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY. IV. STUDIES OF ANIMAL PHYSIOLOGY.
by Warren R. Sanborn. Dec 65, 152p
Miscellaneous Pub-3
See also AD-634 157.

Descriptors: (*Fluorescent antibody techniques, Bibliographies), Immunity, Diseases, Erythrocytes, Leukocytes, Blood platelets, Blood proteins, Pathology, Immunology, Antigens ; antibodies, Tissues (Biology), Cells (Biology), Neoplasma, Abstracts, Indexes.

The volume is one of a series of six annotated bibliographies on various aspects of immunofluorescence and its use. Citations cover the period 1905 through 1962. Volume IV contains 432 annotated literature citations, arranged according to major subject areas, and a complete author index. (Author)

AD-635 110 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brook AFB, Tex.
PAROTID FLUID CORTICOSTEROID RESPONSE IN NORMAL SUBJECTS DURING SINGLE-DOSE DEXAMETHASONE SUPPRESSION TESTS.
Final rept.
by Ira L. Shannon, Steven C. Beering, and Robert L. Jenson. Apr 66, 11p SAM-TR-66-39
Proj. AF-7753
Task 775303

Descriptors: (*Saliva, *Steroids), Corticosteroid agents, Dosage, Inhibition, Response, Adrenocorticotropic hormone, Blood serum, Secretion, Dentistry.

Identifiers: Dexamethasone.

Serum and parotid 17-OHCS measurements were carried out on 6 healthy young adult males during a control week and during a second week in which single-dose dexamethasone tests were performed. There were no significant differences in steroid means for either fluid during the control week. At 8 hours after dexamethasone dosage the serum steroid mean decreased by 84.6% and the decrease in parotid fluid concentration was 76.6%. The highly significant suppression of the level of 17-OHCS in serum was proportionately reflected in the steroid response in parotid fluid. These results suggest that steroid measurements of parotid fluid might well be substituted for serum determinations and reinforce previous observations from our laboratory in this regard. (Author)

AD-635 112 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
WHOLE SALIVA PROTEASE LEVELS IN RELATION TO PERIODONTAL STATUS IN MAN.
Final rept., Jun 62-Dec 63.
by Howard H. Chauncey, and Ira L. Shannon.
Apr 66, 12p SAM-TR-66-35
Task 775303
Prepared in cooperation with Tufts Univ., Boston, Mass. School of Dental Medicine.

Descriptors: (*Saliva, *Peptide hydrolases), Dentistry, Teeth, Diseases, Surgery, Therapy, Cell (Biology), Microorganisms, Enzymes.

Whole saliva protease activity was measured in 83 randomly chosen subjects and in 59 persons with severe periodontal involvement. Thirty-three persons from the latter group were retested at least 3 months after periodontal surgery. Significant differences were found between these subject groupings, protease levels being high in subjects with periodontal disease and decreasing after therapy. Parotid and submaxillary fluids demonstrated no protease activity. The proteolytic enzymes present in whole saliva were observed to originate from both mammalian cellular elements and microorganisms. (Author)

AD-635 113 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF A 'TUBE-TYPE' DIET AND STRESSINDUCING CONDITIONS ON TOOTH MOBILITY.
Rept. for Mar 64-Oct 65,
by Timothy J. O'Leary, Kenneth D. Rudd, Claude L. Nabers, and Arthur J. Stumpf Jr. May 66, 13p
SAM-TR-66-43
Task 775303

Descriptors: (*Teeth, *Diet), (*Mastication, Teeth), Stress (Physiology), Mobility, Ingestion (Physiology), Dentistry.

Three studies were conducted to determine tooth mobility changes. The first two studies considered the effect of a 'tube-type' diet, requiring no mastication, on tooth mobility. The third study evaluated the effect of the same diet, but stress-inducing conditions were added. In the first study, 4 of the 5 participants showed no change from pre-experimental levels for mean tooth mobility after 33 days. The 5th participant, after learning of a family emergency, showed a significant ($P < .01$) increase in mean mobility at the second experimental assessment (33d day). Five subjects subsisted on the 'tube-type' diet for 34 days in a second study. There was no significant difference between the means of the pre-experimental and experimental measurements of the subjects. In a third study, 3 of the subjects displayed evidence of occlusal habits. All 7 subjects were exposed to stress-inducing conditions of confinement and rigid regulation for the first 30 days. There was a significant ($P < .01$) increase in the tooth mobility values for the subjects with occlusal habits. (Author)

AD-635 262 **Field 6E**
CFSTI Prices: HC$1.50 MF$1.00
Indiana Univ., Indianapolis. School of Dentistry.
FLUORESCENCE MICROSCOPY STUDIES OF CELLULAR CHANGES IN CARCINOGENESIS.
Master's thesis.
by Sigurds O. Krolls. 1966, 177p
Contract AF 33 (608)-1238

Descriptors: (*Cancer, Mouth), (*Cytology, Cancer), Histology, Biopsy, Pathology, Morphology (Biology), Cells (Biology), Tissues (Biology), Cell division, Nucleic acids, Polycyclic compounds, Hydrocarbons, Enzymes, Hormones, Viruses, Nutrition, Genetics, Fluorescence, Microscopy, Photomicrography, Skin, Hamsters, Dentistry.

Identifiers: Dimethyl benzanthracene.

The study was designed to evaluate the progressive cellular changes in induced carcinomas in the cheek pouches and the skin in hamsters, utilizing fluorescence and the light microscopy in the examination of tissue and cytologic specimens. Sixty male syrian golden hamsters approximately four weeks old were divided into two equal experimental and control groups. The experimental group was given topical application of 0.5% dimethylbenzanthracene in mineral oil every second day to both cheek pouches and the interscapular area. The control group received similar applications of the vehicle utilized in this study, Mineral oil, heavy grade, (USP). Results indicated that, in the cytologic smears, the fluorescence increases in brightness before any morphologic changes were observed in the Papanicolaou prepared smears and is presumed to be associated with the increase in the nucleic acid concentration before cell division. The tissue sections stained with the fluorochromes revealed the relative concentration of the nucleic acids. The concentration increased in the basal cell layer of the epithelium as the experiment progressed. The cells were brightly fluorescent in the dyskeratotic stage, but as a well differentiated, slow growing epidermoid carcinoma developed, the fluorescence decreased. As the animals developed epidermoid carcinomas, it became apparent that the thickness of the epithelium and the presence of the adnexal structures influenced the length of the latent period. In this experiment the skin lesions and the lesions at the orifice of the pouch developed before true buccal pouch lesions were observed. (Author)

AD-635 270 **Field 6E**
CFSTI Prices: HC$1.50 MF$0.50
Ohio State Univ., Columbus.
THE ATTACHMENT OF CALCULUS TO ROOT PLANED SURFACES.
Master's thesis.
by Raymond Anthony Kopczyk. 1966, 28p

Descriptors: (*Teeth, *Calculi), Diseases, Prosthetics, Therapy, Microorganisms, Histology, Pathology, Histological techniques, Dentistry.

Identifiers: Decalcification.

Sixteen teeth were root planed and allowed to remain in situ until new calculus deposits formed. The teeth were extracted and examined histologically to determine the mechanism by which calculus attaches to root surfaces. The major modes of attachment of calculus to root planed surfaces were by way of a cuticle-like structure and by way of direct attachment of microorganisms. Contributing modes of attachment included a mechanical locking of the calculus mass into splits along the dentinal tubules and into root planing irregularities. (Author)

AD-635 467 **Field 6E**
CFSTI Prices: HC$6.00 MF$0.50
Army Biological Labs., Frederick, Md.
IMMUNOFLUORESCENCE, AND ANNOTATED BIBLIOGRAPHY. V. DIAGNOSTIC APPLICATIONS AND REVIEW ARTICLES.
by Warren R. Sanborn. Dec 65, 50p
Miscellaneous-Pub-3
See also AD-634 942.

Descriptors: (*Fluorescent antibody techniques, Bibliographies), Diagnosis, Physiology, Bacteria, Bacillaceae, Brucellaceae, Enterobacteriaceae, Lactobacillaceae, Mycobacterium, Pleuropneumonia-like organisms, Neisseriaceae, Spirochaetales, Viruses, Herpetic viruses, Myxoviruses, Influenza virus, Rabies virus, Fungi, Protozoa, Rickettsia, Collagen, Diseases, Reviews, Abstracts, Indexes.

Identifiers: Bedsonia, Picornaviruses, Metazoa.

The volume is one of a series of six annotated bibliographies on various aspects of immunofluorescence and its use. Citations cover the period 1905 through 1962 Volume V is divided into two major sections. The first section contains 85 annotated citations to review articles on immunofluorescence arranged according to major subject areas. The second section is devoted to diagnostic techniques. It contains 221 cross-refrerences to citations in the other volumes of this deries, arranged to correspond with subject matter areas in those volumes. A complete author index to the 306 citations is included. (Author)

PB-170 351 **Field 6E, 5C**
CFSTI Prices: HC$3.00 MF$0.75
Oliver-Beckman Italiana S.r.l., Rome (Italy).
THE DENTAL EQUIPMENT MARKET IN ITALY.
May 65, 71p
Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C. Prepared for presentation at Dental Equipment and Supplies show Milan Trade Center, March 12-18, 1966.

Descriptors: (*Dentistry, Instrumentation), (*Italy, Commerce), United States.

Summary: Far as the Italian dental equipment and supplies market appears from saturation - expert trade sources estimate it at only 30% - exceedingly favorable are the opportunities open to export-minded American manufacturers, in view of Italy's small and artisan-type production. Comprising some 60 firms engaged in the production of many primary dental requirements, and particularly of dental units, dental chairs, burrs, X-ray equipment

and other items of equipment, the sector is not large enough to supply more than one-fourth of domestic consumption. In addition much of Italian production is inferior in quality to products manufactured in the United States and other countries, and prospects of markedly increasing its share of the market in the near future are meager. (Author)

PB-170 448 **Field 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Communicable Disease Center, Kansas City, Kans.
ACUTE RESPIRATORY INFECTION IN SCHOOL-AGE CHILDREN.
Semi-annual progress rept., 1 Sep 65-1 Mar 66.
by Tom D. Y. Chin. 1 Mar 66, 21p
Supported by NIH. Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Children), Streptococcus, Parainfluenza virus, Mycoplasma, Pleuropneumonia-like organisms, Serodiagnosis, Antigens + antibodies, Etiology, Public health, Nebraska, Alaska.

Identifiers: Respiratory syncytial virus, Rhinoviruses.

Surveillance of respiratory disease is being conducted in two children's homes and in three public schools in Omaha, Nebraska. During this period, no unusual incidence of acute respiratory disease occurred in the study populations. Of the 121 children in the two homes, 39 had an illness. An agent was recovered from 18 children. Group A streptococcus was the predominating agent. Parainfluenza virus, types 2 and 3, and rhinoviruses were the most common viruses recovered. Mycoplasma hominis type 1 was recovered from a child with pharyngitis. Acute respiratory disease was the most common cause of absenteeism in the schools; it caused 38 percent of all absences. Throat washings were obtained from 233 sick children; 48 yielded an agent. Similar agents were found in the schools as in the children's homes. Mycoplasma pneumoniae was recovered from one student with an upper respiratory illness. Sera were obtained from Eskimo children in three communities in Alaska. Prevalence of antibodies to respiratory syncytial virus varied from 43 to 78 percent. The percentages of children with type 1 parainfluenza antibody ranged from 29 to 53; the percentages for types 2 and 3 ranged from 62 to 76. (Author)

AD-635 256 **See Field 15B**

AD-635 499 **See Field 6K**

PB-170 446 **See Field 6M**

PB-170 452 **See Field 6M**

PB-170 454 **See Field 6M**

PB-170 459 **See Field 6M**

PB-170 460 **See Field 6M**

6F. ENVIRONMENTAL BIOLOGY

AD-635 157 **Field 6F**
CFSTI Prices: HC$3.00 MF$0.75
Alaska Univ., College. Dept. of Biological Sciences.
STUDIES OF THE ECOSYSTEM OF LAKE GEORGE, ALASKA.
Final rept., 1 Mar 63-15 Aug 65.
by L. G. Swartz. Apr 66, 77p
Contract AF 41 (609)-1857
Proj. AF-8241
Task 824101
AAL-TR-65-17

Descriptors: (*Lakes, Ecology), (*Parasites, Ecology), Geology, Climatology, Hydrology, Water, Physical properties, Chemical properties, Plants (Biology), Fishes, Birds, Mammals, Vertebrates, Invertebrates, Plankton, Trematodes, Larvae, Metabolism, Alaska.

Identifiers: Lake George (Alaska), Limnology.

Lake George is a relatively shallow (maximum depth 11 m), eutrophic lake about 18.44 sq. km. in surface area, formed by aggradative damming of a tributary valley by the Tanana River during post-glacial times. Warming of the water is rapid in the spring and reaches a maximum in early July about five to six weeks after ice cover is gone. A relatively unstable thermocline forms and sinks gradually to a depth usually between 8 and 10 m. The euphotic zone extends to the bottom, and the water, under appropriate wind conditions, can probably mix completely at any time during open-water season. Parasitic fauna is relatively poor in comparison with temperate zone lakes. Occurrence of more than one life cycle stage of six helminth parasites was confirmed, suggesting a degree of autonomy in the ecosystem in maintenance of life cycles. Environmental temperature extremes which are faced by aquatic poikilotherms are faced by their parasites as well. Experiments were conducted using a Cartesian diver microrespirometer and metacercaria of Diplostomum (Trematoda; Digenea) from the eyes of fishes, which support the hypothesis that parasites can adjust their metabolic rate appropriately to a given temperature regime.

AD-635 307 **Field 6F, 6C**
CFSTI Prices: HC$3.00 MF$0.50
Minas Gerais Univ., Belo Horizonte (Brazil). Instituto de Biologia.
BASIC BIOLOGY AND TROPISTIC BEHAVIOR OF SCHISTOSOMA MANSONI CERCARTA RELATING TO CERCARICIDAL AGENTS AND CERCARIAL REPELLENTS.
Annual rept. no. 2, 30 Jun 65-30 Jun 66.
by J. Pellegrino. Jun 66, 16p
Grant DA-AR0-49-092-65-G94
Proj. DA-2N014501B71D-00-014-LA

Descriptors: (*Schistosoma, Control), (*Vegetable oils, Pest control), Diseases, Gastropoda, Disease vectors, Plants (Botany), In vivo analysis, Effectiveness, Chymotrypsin, Enzyme inhibitors, Chromatographic analysis, Purification, Chemotherapeutic agents, Toxicity, Drugs, Fishes, Hamsters, Mice, Brazil.

In the search for plant oils as protective agents against the infection of mice by Schistosoma mansoni cercariae, two additional oils (Fennel and Vetiver oils) were found highly effective (Pterodon oil had already been reported as active). The cheek pouch of the hamster is being used for in vivo studies of the mechanisms involved in the protection afforded by these active oils. No protection has been conferred by cedrene and caryophylene - the chief known constituents of Pterodon oil - to mice against the infection by S. mansoni cercariae. Fractionating studies of Pterodon oil are in progress. Remarkable cercaricidal activity is displayed by Pterodon oil. Cedrene slightly affects S. mansoni cercariae and caryophylene was found to be inactive. Pterodon oil does not possess any systemic activity on mature schistosome infections in mice. Three proteolytic components were obtained by column chromatography from S. mansoni cercarial extracts. The major proteolytic fraction shows a chymotryptic like specificity on synthetic substrates. Inhibitors of alpha chymotrypsin also inhibit the cercarial enzyme. The cutaneous response to the purified cercarial enzyme complex is being investigated. Laboratory and field experiments demonstrated that the guppy (Lebistes reticulatus) is an active predator of S. mansoni cercariae and that under special conditions it represents an important limiting factor to the infection of vertebrate hosts. It was shown that most of molluscicides in current use are remarkably toxic for the guppy. Some problems related to the biological control of schistosomiasis snail vectors are discussed. (Author)

N66-15381 **Field 6F**
CFSTI Prices: HC$1.00 MF$0.50
Public Health Service, Washington, D. C. Div. of Environmental Engineering and Food Protection.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AN ON INTERPLANETARY SPACE VEHICLE COMPONENTS.
Quarterly progress rept. 1 Jul - 30 Sep 65.
by R. Angelotti, J. E. Campbell, R. G. Crawford, J. E. Gilchrist, and H. E. Hall. Oct 65, 23p
Contract NASA Order-R-36
NASA-CR-69345

Descriptors: *Bacillus, *Contamination, *Toxicity, *Bacteria.

For abstract, see T 66 16.

PB-170 485 **Field 6F**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Water Conservation Branch.
FIELD EVALUATION OF SOIL-APPLIED HERBICIDES.
Progress rept. no. 3.
by N. E. Otto. 10 Jan 66, 35p WC-23

Descriptors: (*Herbicides, Effectiveness), Plants (Botany), Control, Soils, Triazines, Test methods, Statistical analysis, Atmospheric precipitation.

Identifiers: Uracil.

Twenty-two soil-applied herbicide formulations are being evaluated for their ability to provide complete control of vegetation. These herbicides were applied to replicated 1-sq-rod plots at 3 different application rates. Observational ratings of test plots, obtained over 3 yr of study, indicate that some triazine herbicides and a uracil herbicide were consistently effective in producing good vegetation control at the medium and high application rates. Only the triazine herbicide produced adequate control at the low rate. All inorganic herbicides lost their effectiveness after 3 seasons' exposure, and most materials exhibited a significant decline in activity as compared to the first 2 yr of study. An interim summary of overall performance of each herbicide and rate of application for the 3 yr of testing is included in the report. This study is being conducted to provide information useful to project operating personnel for improving recommendations and selections of herbicides for long-term vegetation control. (Author)

AD-469 666 **See Field 6C**

AD-469 673 **See Field 6C**

AD-635 256 **See Field 15B**

PB-170 481 **See Field 13B**

6H. FOOD

AD-462 927 **Field 6H**
CFSTI Price: HC$1.10
Army Foreign Science and Technology Center, Washington, D. C.
CAN FOOD BE SYNTHESIZED.
Apr 65, 6p FSTC-381-T64-219
Proj. G7-1050
TT-66-61488
Trans. of Priroda (USSR) n1 p37-40 1964.

Descriptors: (*Food, Synthesis (Chemistry)), Fats, Carbohydrates, Proteins, Amino acids, USSR.

A semi-popular discussion is given of problems and prospects in the field of molecular synthesis of food substances.

PB-170 349 **Field 6H, 5C**
CFSTI Prices: HC$3.00 MF$0.75
Institute for Business Studies, Inc., Tokyo (Japan).

THE JAPANESE MARKET FOR HOTEL, RESTAURANT AND INSTITUTIONAL KITCHEN EQUIPMENT.
1965, 83p
Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Kitchen equipment + supplies, Commerce), (*Japan, Commerce), United States.

Conclusion: The potential market in Japan for commercial kitchen utensils and equipment is never small. Japanese manufacturers, distributors, importers and retailers are not systematic in their sales activities but have aspects which vary in individual cases. Neither are the American manufacturers who are marketing in Japan at this moment. But the comprehension of commercial habits, human relations, distribution channels and so forth, which are characteristics of Japanese trade and the maintenance of continued sales activities, will bring the American kitchen utensil, and equipment a good share in the Japanese market. Another good way to advance into the Japanese market would be to make an agreement with a competent Japanese manufacturer of good credit standing, and have the sales activities kept on this ground. The growing popularity of food feeding facilities in enterprises and the increasing number of volume feeding specialists should not be overlooked. And the large-scaled products with good design and with specific functions are promising here in Japan. (Author)

PB-170 350 **Field 6H, 5C**
CFSTI Prices: HC$2.00 MF$0.50
COFREMCA, Paris (France).
THE MARKET FOR EQUIPMENT AND APPLIANCES FOR INSTITUTIONAL KITCHENS IN FRANCE.
May 65, 36p
Availability: Published in Prepared in cooperation with Business and Defense Services Administration, Department of Commerce, Washington, D. C. Prepared for presentation at Institutional Equipment Exhibition, Paris, May 19-23, 1966.

Descriptors: (*Kitchen equipment + supplies, France), (*France, Commerce), United States, Refrigeration systems.

The appliances and machines which could be sold in France by American firms are principally as follows: High pressure cookers and autoclaves. Electric and infra-red grills and rotisseries. Dish-washing machines. Automatic kitchen appliances of low and medium power (choppers, peelers, bread cutters, slicers, crushers, blenders, etc.). Refrigeration appliances, especially freezers and appliances for making ice cubes. Other appliances, such as heating carts, heating tables, and hand utensils, could also be sold in France, but the market for them seems much more limited in value than that for the appliances listed in value than that for the appliances listed above. The latter constitutes very important outlets for the future towards which the principal efforts should be directed. (Author)

PB-170 352 **Field 6H, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Trancu (Theodore C.) and Associates, Milan (Italy).
THE MARKET FOR FOOD PROCESSING EQUIPMENT IN ITALY.
by Theodore C. Trancu. 10 Apr 65, 45p
Availability: Published in Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C. Prepared for presentation at Food Processing Machinery Show, Milan Trade Center, Milan, Febrary 18-23, 1966.

Descriptors: (*Food, Processing), (*Italy, Commerce), Preparation, United States, Machines, Industries, Refrigeration systems, Meet, Flour, Milling machines, Vegetables, Fruits.

It is believed that a show of US Food Processing Equipment at the Milan Trade Center may well be advisable provided that: Such equipment will be displayed as produces or aids in the production of non-traditional foods. This mainly because the Italian industry is well capable of manufacturing practically all equipment and machines needed in the processing of traditional foods. Such equipment as would radically alter production costs by introducing automatic processes, reducing labor and would integrate the productive process, from the raw material to the finished product. Such equipment as produces and/or aids in the production of entirely new types of foods; dough-nut machines, as an example. Deep freeze equipment seems to have great potentialities, but for the time being the market needs to be built up. (Author)

AD-635 377 **See Field 6M**

AD-635 499 **See Field 6K**

6K. LIFE SUPPORT

AD-635 196 **Field 6K, 22A**
CFSTI Prices: HC$6.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
VACUUM DEPLOYMENT TESTS ON AN EXPANDABLE CREW TRANSFER TUNNEL.
Technical rept.
by N. C. Latture. Jul 66, 25p AEDC-TR-66-66
Contract AF 40 (600)-1200
Proj. AF-8170
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Protective coverings, Astronauts), (*Inflatable structures, *Spacecraft components), Motion, Tests, Vacuum, Pressure, Simulation.

Identifiers: Extravehicular activities.

An inflatable crew transfer tunnel, packaged in a canister, was tested in a simulated environment of 0.00001 torr. The canister separation, tunnel deployment, and pressurization were successfully accomplished. A tunnel leakage rate was established over a 24-hr period with the tunnel pressurized to 0.5 atm while in the simulated environment of 0.00001 torr. (Author)

AD-635 499 **Field 6K, 6E, 6H**
CFSTI Prices: HC$1.50 MF$0.50
Army Natick Labs., Mass. Food Div.
DEVELOPMENT OF NUTRITIONALLY DEFINED METABOLIC DIETS FOR AEROSPACE TRAVEL.
Final rept. Jan-Dec 64.
by H. Hollender, H. A. Dymsza, and M. Klicka.
Dec 65, 16p
Proj. AF-7164
Task 716405
AMRL-TR-65-218

Descriptors: (*Diet, Astronauts), Nutrition, Metabolism, Life support, Liquids, Packaging, Taste.

Data compiled during the development of a nutrient defined diet in various flavors and physical forms are presented. The formulation of a liquid form of this diet including the nutrient composition, emulsion stability, antifoaming agents, flavor selection, and the techniques of packaging are discussed. An assessment of the organoleptic quality of the liquid nutrient defined diet by taste panel experts revealed a rating of 6.0 or above for the vanilla and chocolate flavors using a 9 point hedonic scale. Although slightly acceptable to taste panelists, this diet needs major flavor improvement if it is to be considered for use as the sole nutrient source for humans for prolonged periods of time. At the present time, this nutrient defined formulation is considered the best available liquid diet for sole support of humans in aerospace systems. (Author)

AD-635 522 **Field 6K, 22B**
CFSTI Prices: HC$3.00 MF$0.75
Southern California Labs., Stanford Research Inst., South Pasadena.
FEASIBILITY OF REMOVING GASEOUS CONTAMINANTS FROM MANNED SPACE-CABIN ATMOSPHERES BY IONIC PROCESSES.
Final rept., 1 Mar-31 Oct 65.
by George J. Doyle, and Robert G. Caldwell. Feb 66, 71p SSU-5396
Contract AF 33 (615)-2405
Proj. AF-6373
Task 637302
AMRL-TR-66-22

Descriptors: (*Spacecraft cabins, Air pollution), (*Air pollution, Decontamination), Life support, Gas ionization, Purification, Closed ecological systems, Chemical reactions, Feasibility studies, Atmosphere.

The application of ionic processes to the purification of manned space-cabin atmospheres was investigated in anticipation of a need for a radically new atmospheric purification system for some of the presently scheduled space journeys. Processes considered are (1) ion-molecule reactions of contaminant molecules with specific added molecule ions (02 (+), 02 (-)) and (2) clustering of contaminant molecules about specific ions (H30 (+)). Either reaction type can lead to charging of the contaminant molecules (or molecules derived therefrom), allowing collection by an externally applied electric field. Ion-molecule reactions were found to be potentially useful for removal of a large class of contaminant species. However, charge-trapping reactions involving such species as water and oxygen--occurring or energetically capable of occurring concurrently or subsequently to the desired reaction--could interfere, thereby allowing no clear-cut decision as to the applicability of ion-molecule reactions to purification. Clustering was investigated in greater detail than ion-molecule reactions. Detailed calculation of ion-polar molecule interaction energies for typical molecules were carried out. (Author)

N66-16942 **Field 6K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
SPACE SUIT DEVELOPMENT STATUS.
by J. V. Correale, R. S. Johnston, and M. I. Radnofsky. Feb 66, 31p NASA-TN-D-3291

Descriptors: *Flight clothing, *Protective clothing, *Space suit.

For abstract, see T 66 16.

AD-635 206 **See Field 6Q**

6M. MICROBIOLOGY

AD-635 377 **Field 6M, 6H**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
ISOLATION OF MIMA AND HERELLEA FROM AN EXPERIMENTAL SPACE-FLIGHT DIET.
Final rept. 25 Jan-15 Mar 65.
by Joseph T. Cordaro, Robert J. Ball, and Jerome P. Schmidt. Apr 66, 9p SAM-TR-66-38
Task 775302

Descriptors: (*Diet, Space flight), (*Bacteria, Food), (*Food, Contamination), Food dispensing, Astronauts, Culture media.

Identifiers: Mima polymorpha, Herellea vaginicola, Feces, Gram-negative organisms.

Mima, Herellea, and other gram-negative, nonfermenting bacteria were isolated from samples of

an experimental space-flight diet. Identification of these organisms was facilitated by the use of Sellers's differential agar. Although the source of these organisms was not determined, it is possible that the utensils used in preparing the diet were contaminated by the food handler. Mima and Herellea could not be recovered form the feces of subjects subsisting on this diet. (Author)

PB-169 895 **Field 6M**
CFSTI Prices: HC$2.60 MF$0.50
Florida Univ., Gainesville. Coll. of Engineering.
TAXONOMY AND ECOLOGY OF THE SULFUR BACTERIA.
by James B. Lackey, Elsie W. Lackey, George B. Morgan, and Earle B. Phelps. Mar 65, 26p Bulletin Ser-119
Engineering Progress at the University of Florida v19 n3 Mar 1965.

Descriptors: (*Bacteria, Sulfur), Ecology, Morphology (Biology), Oxygen, Toxicity, Temperature, Light, pH.

Identifiers: Sulfur bacteria, Taxonomy.

Contents: Culture; Occurrences in nature (General, Thiorhodaceae, Chlorobacteriaceae, Thiobacteriaceae, Chlamydobacteriaceae, Beggiatoaceae, Thiodendron, Achromatiaceae); Characteristics of waters in which sulfur bacteria were found (temperature, light, pressure, hydrogen ion concentration, current rate, substrate, chemical substrate); Relationships of sulfur bacteria to sulfur and oxygen; The toxicity of H2S to microorganisms; Associations; Taxonomic considerations; The role of sulfur bacteria in nature).

PB-170 446 **Field 6M, 6E**
CFSTI Prices: HC$2.00 MF$0.50
Microbiological Associates, Inc., Bethesda, Md.
DEVELOPMENT AND PRODUCTION OF REAGENTS FOR THE IDENTIFICATION OF TUMORS INDUCED BY VIRUSES.
Annual progress rept., 11 Jan 65-10 Jan 66.
by Klaus Schell. 10 Jan 66, 39p
Contract PH-43-62-200
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Adenoviruses, Antigens + antibodies), (*Antigens + antibodies, Preparation), (*Neoplasms, Viruses), Rubella, Tissue culture, Monkeys, Kidneys, Immune serums, Hamsters, Serodiagnosis.

Identifiers: Complement-fixation tests.

Procedures to produce 'T' or neo-antigens of SV-40 virus and oncogenic adenoviruses were standardized and, employing these procedures, preparations were made of many other human as well as simian and bovine adenoviruses. Production procedures for rubella CF antigen and some of the properties of this antigen are described. The effect of SV-40 virus upon adenovirus multiplication in African green monkey kidney cells is characterized by enhanced replication and CF antigen production as well as by increased oncogenicity of adenovirus type 12 for newborn hamsters. (Author)

PB-170 447 **Field 6M, 6O**
CFSTI Prices: HC$2.00 MF$0.50
Lilly (Eli) and Co., Indianapolis, Ind.
STUDIES OF RESPIRATORY SYNCYTIAL VIRUS VACCINES.
Semi-annual progress rept., Sep 65-Feb 66.
by R. N. Hull, C. B. Reimer, and L. F. Ellis. Feb 66, 48p
Contract PH-43-65-563
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Viruses), (*Viruses, Vaccines), (*Vaccines, Preparation), Tissue culture cells, Stability, Storage, Culture media, Antigens + antibodies, Immune serums, Electron microscopy, Centrifuge separation, Purification.

Identifiers: Respiratory syncytial virus.

Studies of Respiratory Syncytial virus vaccines included both biological and physical aspects with the principle objective being a study of the banding of RS virus in the density gradient ultracentrifuge. Various studies on virus propagation both in the BSC-1 cell line and in primary cultures of chicken or monkey kidney cells were undertaken with the goal of producing optimal yields of virus through the application of techniques found to be effective with other cell-virus systems. Means of enhancing the stability of harvested virus were investigated through observations on the storage of RS virus in various media with different time-temperature relationships. Other standard procedures used in the preparation of viral antigens such as filtration and formalin inactivation were also explored with the result that information useful in the preparation of RS virus vaccine was gained. The preparation of CF antigens and hyperimmune sera to RS virus, and the development of assay methods, especially those for measuring the potency of vaccine comprised a part of the endeavor during this period. (Author)

PB-170 449 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., Seattle.
PREVENTION OF VIRAL RESPIRATORY INFECTIONS.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by J. Thomas Grayston. 1 Mar 66, 11p
Contract PH-43-63-562

Descriptors: (*Respiratory diseases, Viruses), (*Viruses, Tissue culture), Tissue culture cells, Humans, Monkeys, Mice, Kidneys, Biological assay, Culture media, Mycoplasma, Vaccines.

Identifiers: Rhinoviruses.

A plaque assay for rhinovirus M strains was described. Plaque production with rhinovirus HGP was attempted in a variety of cell culture systems: human heteroploid, human diploid, monkey primate and mouse heteroploid. Plaques were observed in primary and secondary monkey kidney cell cultures, but the assay was erratic. The best plaque assay system was obtained with a subline of HeLa cells. Plaques were produced only under exacting medium conditions; increased Magnesium ion and the type of solidifying agent were critical. Purified agar ('Ionagar' and agarose) or methylcellulose permitted formation of large plaques while plaques were not observed with ordinary agar overlay. When 'Ionagar' overlay was employed plaques first appeared at 10 mM Mg (++) with optimum plaque size at 40 mM (2.7 mm at 4 days). Plaques were produced by other rhinoviruses M strains in this system; these included: B-632, ECHO 28 and 5582. Plaque production by these viruses was also found to be dependent on increased magnesium and the employment of purified agar. The sensitivity of human heteroploid cell lines varied widely; two HeLa sublines and WISH cell line were suitable for plaque production while some HeLa sublines and other human heteroploid lines were resistant. Investigation of the mechanism of action of Mg (++) indicated that while the initial rate of virus attachment of HeLa cell monolayers was not increased; virus yield in the HGP-HeLa system was 2-10 fold higher with 30 mM Mg (++) than with 0.8 mM (concentration in Hanks' BSS). (Author)

PB-170 450 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Cutter Labs., Berkeley, Calif. Microbiological Research Dept.
RESEARCH AND DEVELOPMENT OF RESPIRATORY DISEASE VACCINES AND HYPERIMMUNE SERA.
Semi-annual contract rept, 1 Sep 65-1 Mar 66.
by Ralph B. Houlihan. 1 Mar 66, 9p
Contract PH-43-63-90

Descriptors: (*Respiratory diseases, Vaccines), (*Vaccines, Respiratory diseases), (*Immune serums, Respiratory diseases), Globulins, Parainfluenza virus, Influenza virus, Antegens + antibodies, Tissue culture cells, Serodiagnosis.

Identifiers: Hemagglutination-inhibition tests, Respiratory syncytial virus.

A high titered immune serum globulin (ISG) against parainfluenza virus types 1, 2, and 3 was produced for the Vaccine Board and will be evaluated in a clinical trial at the Hektoen Institute. This ISG was prepared from a 350-liter plasma pool obtained from 53 donors at the Arkansas State Prison. The donors were selected on the basis of possessing high HI titers against the three parainfluenza virus types. The HI titers of this ISG against parainfluenza virus types 1, 2, and 3 are 1/512, 1/1024, and 1/1024, respectively, as compared to titers of 1/24, 1/128, and 1/512 in regular ISG. In addition, neutralization titers of 1/512 against influenza A2 and >1/512 against influenza B were determined for this ISG. HI tests against parainfluenza virus type 1 were performed on serum samples from the NIH Cold Test no. 12 conducted at the Lorton Reformatory. A micro serum neutralization against respiratory syncytial (RS) virus is in the process of development for use in screening donors with high antibody titers against this virus. (Author)

PB-170 451 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Microbiological Associates, Inc., Bethesda, Md.
CHARACTERIZATION OF THE ADENOVIRUS TYPE 12-RAT EMBRYO TRANSFORMATION SYSTEM.
Semi-annual contract progress rept., 1 Sep 65, 1 Mar 66.
by Aaron E. Freeman. 1 Mar 66, 10p
Contract PH-43-63-81

Descriptors: (*Cells (Biology), Transformations), (*Adenoviruses, Transformations), Morphology (Biology), Culture media, Calcium, Tissue culture cells, Embryos, Rats, Antigens + antibodies, Chromosomes, Humans, Fluorescent antibody techniques.

One of the goals of the research is to investigate the transformation of human cells by human virus. Adenovirus type 12, known to be oncogenic in hamsters and rats, is a virus of special interest. Although transformation of hamster, rat, and rabbit cells with this virus has been reported, the transformation process has not been reliable, and attempts to repeat the work were unsuccessful. In order to develop an adenovirus type 12 human-cell transformation system, it is first necessary to be able to develop a reliable adenovirus type 12-mammalian cell transformation system. In order to develop this system, the basic factors influencing transformation and cell line derivation must be understood. The present study indicates that the concentration of calcium in the medium influences the rate of identifiable transformed focus formation and the efficiency of transformed cell line derivation. Further, a reliable adenovirus type 12-mammalian cell transformation system is reported along with a partial characterization of the transformed cells. (Author)

PB-170 452 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Microbiological Associates, Inc., Bethesda, Md.
THE DEVELOPMENT OF NEW CELL LINES AS TOOLS FOR DETERMINING THE RELATIONSHIP BETWEEN VIRUS AND CANCER.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by Aaron E. Freeman, and Paul J. Price. 1 Mar 66, 5p
Contract PH43-63-81

Descriptors: (*Cancer, *Viruses), In vitro analysis, In vivo analysis, Transformations, Cells (Biology), Adenoviruses, Tissue culture cells, Transplantation, Hamsters, Rats, Humans.

Many studies on the in vitro transformation of cell lines by virus and on virus in vivo induction of malignant tumors revolve around the development of new cell lines. These cell lines, free of external host influences, are valuable tools in determining the relationship between virus and cancer. The report lists and partially characterizes the cell lines developed during the past six months. (Author)

PB-170 454 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Viral and Rickettsial Disease Lab., Calif. Dept. of Public Health. Berkeley.
SURVEILLANCE OF VIRAL RESPIRATORY DISEASES AND VACCINE EVALUATION IN A PEDIATRIC POPULATION.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66.
by Edwin H. Lennette. 1 Mar 66, 16p
Contract PH-43-63-1141

Descriptors: (*Respiratory diseases, Children), (*Vaccines, Respiratory diseases), Adenoviruses, Influenza virus, Serodiagnosis, Periodic variations, Infants, Public health, Military facilities, Army personnel, California.

The continuing surveillance of acute respiratory illness (ARI) in the pediatric population at Fort Ord, California revealed a very low incidence of these illnesses for the period from May to September, 1965. During this period there were few hospital admissions for ARI and most of these illnesses could not be associated with any of the important respiratory viruses. In the fall and early winter of 1965, the expected upswing in ARI was not observed. In late January and February, 1966, the admissions for ARI to the pediatric ward increased sharply. This increase may be associated with the epidemic of influenza due to the type A2 virus which started in California about the same time, or may represent the delayed emergence of the usual pediatric respiratory diseases at Fort Ord. A total of 150 families was enrolled in the longitudinal study of infants born at Fort Ord, as of December 31, 1965. Preliminary data from this study reveals a large difference in the projected annual rate of ARI as recorded by mothers, compared to a projected annual rate based on observations made during routine home visits. The latter is over 4 times larger than the rate based on the mothers' histories. Most of the information obtained thus-far on the newborns was collected during the low incidence months for respiratory disease and thus cannot be considered representative of a full year's experience. The projected rates and the average duration of the recorded episodes of ARI were similar in both sexes. (Author)

PB-170 455 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania Univ., Philadelphia.
DEVELOPMENT OF A LIVE VACCINE FOR HUMAN INFLUENZA.
Semi-Annual Contract Progress rept., 15 Sep 65-1 Mar 66.
by Florence S. Lief. 1 Mar 66, 12p
Contract PH-43-66-465

Descriptors: (*Influenza virus, Vaccines), (*Vaccines, Influenza virus), Dosage, Sprays, Nose, Throat, Sensitivity, Antigens + antibodies, Serodiagnosis, Humans.

The responses to two live influenza vaccine strains are presently being tested in human volunteers under conditions of strict isolation. The vaccines, which represent two substrains derived from a 1957 A2 parent isolate, possess contrasting biologic properties. An attempt is being made to correlate their effects in humans with these properties. Thus far, it has been found that when administered by spray into the nose and throat, approximately 10 to the 7th power EID50 of either strain apparently is noninfective as determined by virus recovery or antibody conversion. However, when administered in larger amounts, i.e. close to 10 to the 9th power EID50 per dose, virus which is inhibitor sensitive evidently multiplies and may be recovered from the upper respiratory tract over a period of several days. Whether this is followed by antibody increases remains to be determined. (Author)

PB-170 456 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Children's Hospital Research Foundation, Washington, D. C.
RHINOVIRUS REFERENCE LABORATORY, NIAID COLLABORATIVE PROGRAM.
Semi-annual contract progress rept., Sep-1 Mar 66.
by Vincent V. Hamparian, Robert M. Conant, and Henry G. Cramblett. 1 Mar 66, 19p
Contract PHS-Ph-43-65-562
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Viruses, Serodiagnosis), (*Immune serums, Viruses), Respiratory diseases, Tissue culture cells, Liver, Humans, Toxicity, Preparation, Test methods.

Identifiers: Rhinoviruses.

A total of 67 acceptable candidate prototype rhinoviruses have been received from various investigators. Satisfactory seed stocks for these agents have been prepared in HeLa cell cultures. Eighty-two lots of sera for 67 rhinovirus strains have been received. Recently, cross neutralization tests were initiated utilizing these 67 viruses and 67 antisera. To date, 8 rhinoviruses have been tested satisfactorily against all 67 antisera. (Author)

PB-170 457 **Field 6M**
CFSTI Prices: HC$3.00 MF$0.75
Abbott Labs., North Chicago, Ill.
RESEARCH AND DEVELOPMENT OF RHINOVIRUS, RS AND MYCOPLASMA PNEUMONIAE VACCINES.
Semi-annual contract progress rept., 1 Sep 65, 1 Mar 66.
by Jacob C. Holper. 1 Mar 66, 65p
Contract PHS-Ph-43-62-487
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Viruses, Vaccines), (*Vaccines, Preparation), Respiratory diseases, Test methods, Centrifuge separation, Chemical precipitation, Immune serums, Antigens + antibodies, Tissue culture cells, Pleuropneumonia-like organisms, Mycoplasma.

Identifiers: Rhinoviruses, Respiratory syncytial virus.

Rhinoviruses: Concentrated 33342 vaccine is on final safety tests before potency tests in man. Live 353 vaccine, encapsulated and stabilized, has passed all safety tests and is ready for tests in man. Other vaccines have been prepared and are in final stages of safety testing. Infectivity and potency of rhinoviruses have been concentrated and purified by centrifugation. Bouyant density of rhinoviruses ranged from 1.38 to 1.41 gm/cc in cesium chloride. Rhinoviruses were concentrated by precipitation with methanol and ethanol, ammonium sulfate and zinc acetate. None of these methods appears to be as effective, overall, as can be achieved with the zonal ultracentrifuge. Thirty four lots of rhinovirus antisera have been prepared for dissemination to the various surveillance centers. Twenty three lots of live rhinovirus antigens have been prepared in WI cells. Respiratory Syncytial Virus: Good yields of RS virus were recovered from bovine kidney cells. Both CF and neutralizing antibody were induced by harvest material and virus concentrated by centrifugation or zinc acetate precipitation. Ferrets infected intranasally or by eye inoculation shed virus and produced antibody but had no definite respiratory symptoms of infection. Virus was rapidly inactivated by formaldehyde. Mycoplasma pneumoniae: M. pneumoniae has been cultivated on glass to titers of 10 to the 8th power to 10 to the 9th power colony forming units and CF titers of 2 to 8 in horse and calf sera media. The PPLO cells can apparently be washed free of the sera component of the media. (Author)

PB-170 458 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
Flow Labs., Inc., Rockville, Md.
DEVELOPMENTAL STUDY RELATING TO THE PREPARATION OF A RESPIRATORY SYNCYTIAL VIRUS VACCINE.
Semi-annual progress rept., 1 Sep 65-1 Mar 66.
by L. Potash. 1 Mar 66, 41p
Contract PHS-Ph-43-64-943
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Viruses, Vaccines), (*Vaccines, Preparation), Respiratory diseases, Tissue culture, Culture media, Antigens + antibodies, Monkeys, Mice, Central nervous system, Guinea pigs, Sensitivity, Immunity, Biological assay, Dosage, Immune serums, Chromatographic analysis, Proteins, Hamsters.

Identifiers: Respiratory syncytial virus.

The adaptation and serial passage of five human RS strains in four different animal tissue culture systems for the purpose of selecting attenuated variants is proceeding satisfactorily. Five virus seed pools at the 11th serial passage level are being prepared and safety tested. The technique for producing macroplaques of RS virus in AGMK petri dish cultures under hydrolyzed starch has been standardized. A definitive study in African green monkeys indicated that intranasal instillation of RS does not regularly produce overt illness although infection does occur. Studies are continuing relating to the preparation of type specific antibody in monkeys against the various strains of RS virus. Studies are proceeding satisfactorily with the adaptation of the Maassab strain of RS to the CNS of the newborn mouse. Experiments have indicated that the guinea pig is a more sensitive animal than the mouse for the measurement of the immunogenicity of RS vaccines, and that it is possible to quantitate vaccine potency by antigen extinction assay using a one dose immunization procedure. Further studies have confirmed the finding that the detection of RS neutralizing antibodies can be greatly increased by the use of unheated immune sera or by the addition of normal serum (accessory factor) in the test system. The methods of preparation of concentrates of RS infective fluids grown in different tissue culture systems for subsequent CF chromatography studies is presented. (Author)

PB-170 459 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill. School of Medicine.
EVALUATION OF RESPIRATORY VACCINES IN MEDICAL STUDENT VOLUNTEERS AND A GERIATRIC GROUP.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by Dorothy Hamre, and John J. Procknow. 1 Mar 66, 7p
Contract PHS-Ph-43-63-564
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Viruses), (*Vaccines, Respiratory diseases), Aging (Physiology), Medical personnel, Students, Myxoviruses, Pleuropneumonia-like organisms, Mycoplasma, Etiology, Immune serums.

Identifiers: Rhinoviruses, Respiratory syncytial virus.

Except for one small outbreak in November there has been no respiratory illness among residents of the Drexel Home for the Aged. One isolation of a rhinovirus (coryzatype 16-181) was made from an acute specimen during that outbreak. In early February respiratory syncytial virus was isolated from an acute specimen from an employee of the Home. No isolations from the residents of the Home were made nor was there any increase in the URI. The incidence of URI among medical students enrolled in the study has been similar to that in previous years. Virus isolations have also followed the same pattern with rhinoviruses predominating in the fall and myxoviruses in the winter quarter. Serotyping of rhinoviruses is incomplete but several strains of HGP have been isolated which are related to but not identical with the prototype. Only one isolation of Mycoplasma pneumoniae and three of Mycoplasma hominis have resulted from cultural attempts on all acute and convalescent specimens from the medical students. No Mycoplasma were isolated from the Drexel Home specimens. (Author)

PB-170 460 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Tulane Univ., New Orleans, La. School of Medicine.
EXPERIMENTAL RESPIRATORY DISEASE VACCINE STUDIES IN SEVERAL POPULATIONS.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by William J. Mogabgab. 1 Mar 66, 4p
Contract PHS-Ph-43-63-75
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Vaccines), (*Vaccines, Respiratory diseases), Population, Epidemiology, Viruses, Antigens + antibodies, Adenoviruses, Pleuropneumonia-like organisms, Mycoplasma, Immune serums, Louisiana.

Identifiers: Rhinoviruses.

During the first two months on the Tulane University campus there was the usual initial increased rate of respiratory disease, but this year this was due to an epidemic of common cold viruses. Primarily, U of C, 140F was the predominant virus and 16 isolates were obtained from 70 throat washings and serologic incidence was still higher. Secondary viruses included a variant of HGP (K2211) and K779 (B632). Ten percent of the specimens contained the former virus, but the later was detected only by neutralizing antibody responses. Also of interest was the occurrence of complement-fixing antibody increments with adenovirus in 5 individuals. Infection by Mycoplasma pneumoniae was scarce during the fall of 1965 and clinical pneumonia cases were rare. Additional rhinoviruses isolated during 1964-65 were identified. During the fall there was an outbreak of U of C, 106F in addition to GL2060 and U of C, 179E. Two of the 4 candidate rhinoviruses submitted to the Vaccine Development Board classification and testing program have been found to be identical to other strains. E2-46 appeared to be the same as 037211 or Baylor 1 and E2-133 was neutralized by 58750 antiserum. (Author)

PB-170 461 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Chilren's Hospital Research Foundation, Washington, D. C. Virology Section.
INACTIVATED PARAINFLUENZA TYPE 1 AND RESPIRATORY SYNCYTIAL VIRUS VACCINES IN INFANTS.
Semi-annual contract progress rept., Sep 65-Mar 66.
by Robert H. Parrott, Hyun Wha Kim, Julita O. Arrobio, Andrew J. Vargosko, and Jose G. Canchola. Mar 66, 16p
Contract PH-43-62-473
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Parainfluenza virus, Vaccines), (Vaccines, Infants), Antigens + antibodies, Tissue culture, Injection (Medicine), Growth, Respiratory diseases.

Identifiers: Respiratory syncytial virus.

Studies are in progress to determine the antigenicity and potential protection against infection and illness produced by a formalin-inactivated alum-precipitated tissue culture grown parainfluenza type 1 virus vaccine (no. 23) and a formalin-inactivated alum-precipitated tissue culture grown respiratory syncytial virus vaccine (no. 100). At this point in the studies 14 infants have received one or more injections of each of these vaccines. Neutralization tests are completed on serums obtained after initial injection of vaccine on eight infants who received vaccine no. 23 and eight who received vaccine no. 100. No conclusions can be drawn except that significant antibody responses are not induced after the first injection in infants who lack prior neutralizing antibody. One infant who had received two injections of respiratory syncytial vaccine became infected with respiratory syncytial virus 18 days after the second injection and showed severe bronchiolitis. (Author)

AD-635 256 **See Field 15B**

PB-170 448 **See Field 6E**

6O. PHARMACOLOGY

AD-634 836 **See Field 6A**

PB-170 447 **See Field 6M**

6P. PHYSIOLOGY

AD-634 922 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
MEASUREMENT OF LEFT CIRCUMFLEX CORONARY FLOW, CARDIAC OUTPUT, AND CENTRAL AORTIC PRESSURE IN THE UNMEDICATED GREYHOUND DOG,
by LeRoy S. Wirthlin, and E. Peter Beck. 2 May 66, 20p NAMI-962
NAVMED-MR005.13-7004.5.17

Descriptors: (*Heart, *Blood circulation), Blood pressure, Aorta, Flowmeters, Metabolism, Oxygen, Carbon dioxide, Implants, Cannulation, Surgical techniques, Dogs.

To study coronary flow dynamics under basal and changing environmental conditions, it was necessary to develop a standard animal preparation in which left circumflex coronary flow, phasic systemic cardiac output, and central aortic pressure could be measured in the awake, unmedicated state. A technique involving the surgical implantation of electromagnetic flow probes and chronic sampling catheters was successfully applied to nine greyhound dogs. Left circumflexes coronary artery (LCCA) flow data, cardiac output, and central aortic blood pressure determinations are presented. In addition, coronary sinus blood determinations for five of the animals (together with the flow data) are included. LCCA flow ranged from 57 to 130 ml/min (35 to 57 ml/100 gm left ventricle/min.). Twenty to forty-seven per cent of flow occurred during left ventricular systole. Oxygen usage ranged from 7.6 to 11.9 ml/min (4.8 to 9.8 ml/100 gm left ventricle/min). The LCCA flow patterns and the range of flow values agree closely with those reported previously by Gregg. It was felt that our measurements were made in the resting but not necessarily basal state. (Author)

PB-169 802 **Field 6P**
CFSTI Prices: HC$2.00 MF$0.50
Burke Rehabilitation Center, White Plains, N. Y. Nutritional and Metabolic Research Div.
ANNUAL PROGRESS REPORT 1965.
by BY Anthony A. Albanese. 1965, 26p
Availability: Published in Prepared in cooperation with Geriatric Nutrition Lab., Miriam Osborn Memorial Rome Rye, N. Y.

Descriptors: (*Nutrition, Metabolism), Proteins, Amino acids, Exercise, Carbohydrates, Aging (Physiology), Bone, Hormones, Fats, Steriods, Microwaves, Alkaloids.

Contents: Protein and amino acid nutrition (Metabolic effects of physical activity, Metabolic effects of nicotine exposure); Geriatric nutrition (Carbohydrate utilization, Osteoporosis, Anemia); Hormonal agents (Anti-corticocatabolic activity index (ACAI), Parenteral anabolic steroids, Effect of anabolic steroids on carbohydrate and fat metabolism); Methods (Microwave determination of composition of solutions, Estimation of bone density, Metabolites of aromatic amino acids).

AD-634 784 **See Field 5J**

AD-634 836 **See Field 6A**

6Q. PROTECTIVE EQUIPMENT

AD-635 206 **Field 6Q, 6K, 22A**
CFSTI Prices: HC$3.00 MF$2.00
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
A STUDY OF TECHNIQUES AND EQUIPMENT FOR THE EVALUATION OF EXTRAVEHICULAR PROTECTIVE GARMENTS.
Final rept., Aug 64-Jun 65.
by David G. Parry, LeRoy R. Curry Jr, Donald B. Hanson, and George B. Towle. Feb 66, 427p
HSER-3671
Contract AF 33 (615)-1780
Proj. AF-6301
Task 630104
AMRL-TR-66-4

Descriptors: (*Astronauts, *Pressure suits), (*Protective clothing, Astronauts), Closed ecological systems, Life support, Space environmental conditions, Performance (Human), Models (Stimulations), Anthropometry, Thermal conductivity, Heat transfer, Loading (Mechanics), Joints (Physiology), Metabolism, Mobility, Torque, Gloves, Helmets, Radiation hazards, Data processing systems, Telemeter systems, Test methods, Partial differential equations, Matrix algebra, Goniometers, Space simulation chambers, Body temperature, Oxygen consumption.

Identifiers: Extravehicular activities.

The purpose of this study was to establish a test methodology and a test system for objective, quantitative, and accurate evaluation of extravehicular space protective garments. Areas of testing studied include functional performance, life support, and environmental protection. Emphasis is placed on the problem of suit torque restraints, i. e., mobility. Concepts for appropriate evaluation criteria are discussed. The information presented and conclusions reached are the results of experience in suit testing, technical analysis, search of the literature, and discussions with experts. The nature and causes of suit torque restraint are discussed and a pin jointed model is developed for precise description of suit torques and body interlink angles. Various techniques for torque vector and body angle measurements are explored and it is concluded that a powered articulated dummy and an intrasuit exoskeletal electrogoniometer with off-line computer coupling are required to produce accurate data and useful figures of merit. Measurement techniques for reach envelope, glove evaluation, and comfort are also discussed. (Author)

PB-470 908 **See Field 7E**

6R. RADIOBIOLOGY

AD-635 086 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Armed Forces Radiobiology Research Inst., Bethesda, Md.
ERYTHROCYTE STEM CELL KINETICS IN THE POSTRADIATION RAT.
Scientific rept.
by S. J. Baum. May 66, 23p AFRRI-SR66-4
Proj. DB-03.1473

Descriptors: (*Erythrocytes, *Radiation effects), (*Hemopoietic system, Radiation effects), X-rays, Iron, Radiobiology, Pathology, Reviews.

In rats exposed to 300 R of 250 KVP X-rays, erythropoiesis as measured by 59 Fe uptake diminished greatly for 48 hours followed by a rapid recovery approaching near normal values approximately 6 days after radiation. It has been postulated that the rate of recovery was primarily due to accelerated relwase of noninjured stem cells. The present experiment was designed to test this hypothesis. The polycythemic rat preparation was used since it permits the experimenter to control the release of erythrocyte stem cells. In polycythemic rats observed for 17 days postradiation (300 R of 250 KVP X-rays), stem cell release dimished to 8 percent of the control values during the first 24 hours. This was followed by a rapid recovery from the 2nd to the 5th day. A second decrease was noted from the 6th to the 9th day and a third depression from the 9th to the 12th day. Thereafter, the oscillations diminished indicating a possible return toward the preradiation normal state. An attempt was made to correlate these findings with a kinetic model of erythropoiesis. It was suggested that the initial depression in stem cell release might be due to cellular destruction and inhibitions of cellular release mechanisms. The oscillations of the recovery curve were ascribed to possible rate differences in cellular movements from one precursor compartment to the subsequent one, and to competitive stimulations for progenitor cells from related cellular systems of the hematopoietic system. (Author)

AD-635 167 **Field 6R, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Armed Forces Radiobiology Research Inc., Bethesda, Md.
ESTIMATION OF PARAMETERS IN MULTIVARIATE EXPERIMENTAL DESIGN AND A HYPOTHETICAL APPLICATION TO ESTIMATING FRACTIONAL DOSE RECOVERY EFFECTS.
by J. A. Greenwood. Feb 66, 26p AFRRI-TN66-2
Proj. 03.064

Descriptors: (*Radiation effects, Biometry), (*Experimental design, Biometry), Radiation tolerance, Multivariate analysis.

A statistical technique is explained, derived and illustrated. It is believed that a study of the values of the terms of the assumed mathematical model (or the graphs therefrom) would be of great informational help to the scientist in interpreting his results. Analysis of variance, components of variance analysis, and the estimation technique described herein applied to a properly designed experiment will go far toward extracting all the relevant information from a sample. Estimation formulas for the terms of the assumed mathematical model are derived for two of the most used statistical experimental designs, the factorial and the orthogonal squares. The method is illustrated on a three-variable, hypothetical dose recovery experiment. It is pointed out that the method gives one a handle on measuring quantitatively the separate and joint contributions to the observed effect, of variables otherwise hopelessly correlated and overlapping. (Author)

AD-635 204 **Field 6R, 22A, 3B**
CFSTI Prices: HC$4.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
FLARE HAZARDS AT SOLAR MINIMUM: DOSIMETRIC EVALUATION OF THE CLASS 2 FLARE OF FEBRUARY 5, 1965.
by Hermann J. Schaefer. 2 Jun 66, 17p NAMI-970
NASA Order-R-75
NAVMED-MF022.03-5001.35

Descriptors: (*Solar flares, *Radiation hazards), (*Space flight, Radiation hazards), Cosmic rays, Protons, Dose rate, Shielding, Spacecraft components, Scientific satellites, Polar orbit trajectories, Radiation measurement systems, Space medicine.

The proton energy spectra for the Class 2 solar flare of February 5, 1965, as reported by a polar orbit satellite at five different times during the two-day period of enhanced intensity, are evaluated in terms of tissue depth doses for a semi-infinite slab with 0.1 g/sq cm shielding and for the Gemini and Apollo shield distribution. Maximum dose rates for the tissue surface are 714 millirads/hour, 81 and 11 millirads/hour, respectively. For the unidirectional beams, half value layers range from 2.6 to 5.6 millimeters of tissue. The integral flare dose over forty-four hours is 8.3 rads for the tissue surface behind 0.1 g/sq cm shielding. (Author)

AD-635 251 **Field 6R**
CFSTI Prices: HC$6.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
TREADMILL EXERCISE PERFORMANCE BY THE AGEING IRRADIATED RAT.
by Dave C. Jones, Garold K. Osborn, and Donald J. Kimeldorf. 5 May 66, 27p USNRDL-TR-1017

Descriptors: (*Radiation effects, *Aging (Physiology)), (*Life span, Radiation effects), Whole body irradiation, Sublethal dosage, Lethal dosage, X-rays, Neutrons, Exercise, Growth, Pulse rate, Body temperature, Body weight, Performance tests, Rats.

Identifiers: Heart rate.

The ability of male Sprague-Dawley rats irradiated as young adults to perform on an inclined treadmill was evaluated at 3, 10, 16, 22, and 28 months of age. Irradiated groups received whole-body sublethal (30-day) or lethal-range doses of x-rays (430 or 680 rads) or fast neutrons (230 or 320 rads) after the first treadmill tests. In spite of reductions in treadmill speed, the proportion of the control group which completed the task declined gradually through the first two years, then decreased markedly at 28 months. The gradual progressive decrement in the proportion of the group which completed the task was also apparent in the irradiated animals but the rapid deterioration in performance ability occurred at 22 months of age. The terminal deterioration appears associated with approaching death, and its earlier appearance in irradiated groups is associated with radiation-induced lifespan shortening. For those control animals able to complete the task, there was an abrupt rise in heart rate with the onset of exercise, little or no change during the remainder of the one-hour exercise period, and a return to pre-exercise levels within a half-hour after cessation. The pattern of heart rate with exercise was not markedly affected by age and only occasional differences between irradiated and control groups were noted. Although colonic temperature increased with the initiation of exercise at all ages, the pattern during the remainder of exercise varied with age at the time of test. At younger (3 months) or older (21, 28 months) ages, temperature either decreased or remained stable until the end of exercise. At 10 and at 16 months of age, temperature continued to increase beyond the initial moments of exercise in controls so that heat was accumulated rather than dissipated. (Author)

CEX-65.01 **Field 6R, 18D, 20G**
CFSTI Prices: HC$1.00 MF$0.75
Oak Ridge National Lab., Tenn.
FEASIBILITY STUDY INTENSE 14-MEV NEUTRON SOURCE FOR OPERATION HENRE.
by T. G. Provenzano, E. J. Story, and F. F. Haywood. Sep 65, 65p
Contract W-7405-eng-26

Descriptors: (*Particle accelerators, Feasibility studies), (*Neutrons, Deuteron bombardments).

Identifiers: Henre.

For abstract, see N 20 14.

IDO-12051 **Field 6R, 5B**
CFSTI Prices: HC$2.00 MF$0.50
Idaho Operations Office (AEC), Idaho Falls. Health and Safety Div.
AIRBORNE PARTICLE SIZE ANALYSIS. A COMPOSITE BIBLIOGRAPHY.
by J. T. Collins, Jr, W. J. Harrie, and D. D. Stromberg. May 66, 37p

Descriptors: (*Particle size, Airborne), (*Bibliographies, Particle size).

For abstract, see N 20 14.

PB-169 537 **Field 6R**
CFSTI Prices: HC$1.60 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
ATMOSPHERE PLAQUETTAIRE, ETUDE DES FACTEURS II ET VII. MODIFICATIONS APPORTEES PAR LES RAYONS X (Plattlet Atmosphere, Study of Factors II and VII. Modifications Brought about by X-Rays),
by Daniel Hollard, Jean Darnault, Francoise Rambaud, Michel Suscillon, and Genevieve Marcille.
Mar 66, 12p CEA-R-2953
Text in French; Attached Summary in English.

Descriptors: (*Blood platelets, X-rays), (*X-rays, Blood platelets), (*Blood groups, Radiation effects), Blood cells, Surfaces, Adsorption, Cleaning, France.

After a quantitative measure of factor II and VII adsorbed at the plattlet surface, comparison is made of these factors to: (1) A large number of washes; (2) irradiations of 0 to 70,000R. It appears that these factors are not solidly fixed at the plattlet because: (1) 10 washes are sufficient to get rid of each of the 2 factors; (2) 1500R overthrow factor VII; (3) 40,000R are necessary to suppress F II. (Author)

AD-635 037 **See Field 18C**

CEX-59.4.23 **See Field 18H**

IDO-17140 **See Field 18H**

6S. STRESS PHYSIOLOGY

AD-634 798 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
Naval Submarine Medical Center, Groton, Conn.
OXYGEN BREATHING EFFECTS UPON NIGHT VISION THRESHOLDS,
by Paul R. Kent. 2 Feb 66, 19p Rept. no. 469
NAVMED-MF011.99-9002.03

Descriptors: (*Pressure breathing, *Vision), Visual perception, Night sky, Thresholds (Physiology), Adaptation (Physiology), Oxygen consumption, Blood, Glucose, Oxygen, Stress (Physiology), Breathing masks, Respiration, High-pressure research, Toxicity, Test methods, Reviews.

Two series of experiments were conducted, --one was concerned with the effects of mask breathing, and the other with breathing 100% oxygen at ambient (sea level) pressure. It was found that the effect of oxygen excess upon rod and cone scotopic threshold is subject to individual variation. Rod and cone scotopic thresholds are only exceptional-

ly affected by breathing near-100% oxygen for periods up to 140 minutes. When administered at higher pressures, even for periods as short as 20 minutes, the incidence of effects is sharply higher. Rod and cone scotopic thresholds, measured while breathing near-100% oxygen are sensitive to blood sugar levels. Breathing through a mask-demand valve system of the type used in these experiments may cause an elevation of the rod and/or cone scotopic threshold (s) of some individuals, apart from any effect of the inhalant. (Author)

AD-635 518 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval Submarine Medical Center, Groton, Conn. Medical Research Lab.
VERTIGO AMONG DIVERS.
Special rept (Interim).
by Lewis Terry, and W. Landon Dennison. 8 Apr 66, 11p
NSMC-SR-66-2

Descriptors: (*Vertigo, Diving), (*Naval personnel, Vertigo), Ear, Stimulation, Pressure, Body fluids, Motion.

Identifiers: Divers.

Vertigo is a common symptom among divers, although its incidence has not heretofore been given the consideration it may deserve. The authors feel that the incidence of this symptom among divers is in consonance with the experience of the diver, that is, many divers will experience vertigo if they dive long enough. Vertigo must be recognized and differentiated from the more severe forms of dysbarism, particularly when it manifests itself by a loss of balance, nausea, and unconsciousness. Both pressure changes within the middle ear and caloric stimulation may play an important role in the development of vertigo among divers. Inequality of the caloric stimulation (between the right and left ear) appears to play only a minor role. The important factor seems to be the movement of endolymph, whether by eddy currents from movements of the stapes or convection currents caused by caloric stimulation. (Author)

N66-15580 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.75
Naval School of Aviation Medicine, Pensacola, Fla.
VISUAL LOCALIZATION OF THE HORIZONTAL AS A FUNCTION OF BODY TILT UP TO PLUS OR MINUS 90 DEG FROM GRAVITATIONAL VERTICAL.
by A. R. Fregly, A. Graybiel, E. F. Miller II, and G. Van Den Brink. 3 Aug 65, 25p Rept. no. 118
Contract NASA Order-R-47
NASA-CR-69427

Descriptors: *Visual perception, *Positioning, *Space orientation, *Visual cue.

For abstract, see T 66 16.

N66-15580 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.75
Naval School of Aviation Medicine, Pensacola, Fla.
VISUAL LOCALIZATION OF THE HORIZONTAL AS A FUNCTION OF BODY TILT UP TO PLUS OR MINUS 90 DEG FROM GRAVITATIONAL VERTICAL.
by A R. Fregly, A. Graybiel, E. F. Miller II, and G. Van Den Brink. 3 Aug 65, 25p Rept. no. 118
Contract NASA Order-R-47
NASA-CR-69427

Descriptors: *Visual perception, *Positioning, *Space orientation, *Visual cue.

AD-635 205 **See Field 5J**

6T. TOXICOLOGY

AD-635 111 **Field 6T, 6A**
CFSTI Prices: HC$1.00 MF$0.50
City of Hope Medical Center, Duarte, Calif. Dept. of Biochemistry.
BIOCHEMICAL STUDIES ON ACUTE HYDRAZINE TOXICITY IN MICE.
Final rept., 1 Jul 64-30 Jun 65.
by Eugene Roberts, and Daisy G. Simonsen. Apr 66, 22p
Contract AF 41 (609)-2614
Task 630207
SAM-TR-66-33

Descriptors: (*Hydrazine, Toxicity), Biochemistry, Amino acids, Urea, Liver, Lipids, Metabolism, Succinic acids, Tissues (Biology), Chromatographic analysis, Mice.

Identifiers: Citrulline, Ornithine, Arginine.

Two-dimensional paper chromatographic methods were employed to study the changes produced in amino acid distribution in tissues of normal mice, mice treated with hydrazine, and mice pretreated with protective amino acids before injection with hydrazine. The data suggest that the symptoms of acute hydrazine toxicity do not coincide with any major effects on carbohydrate or amino acid metabolism of brain but do occur at a time when significant changes are noted in amino acid distribution in liver. Particular attention was paid to the area of arginine metabolism. Although arginine injection, itself, produced only an increase in ornithine content in the liver, when arginine was followed in 30 minutes by the administration of hydrazine there were marked increases in both ornithine and citrulline levels. In no instance was there any evidence of the accumulation of argininosuccinic acid. The data were tentatively interpreted to indicate that under ordinary conditions the rate-limiting step in the ornithine cycle of liver may be the carbamylation of ornithine, but that in hydrazine-poisoned animals the condensation reaction of citrulline with aspartic acid to give argininosuccinic acid might become rate-limiting. The significance of this finding is under further investigation, as well as the possibility that changes observed in other ninhydrinreactive constituents in the livers of hydrazine-poisoned animals might be secondary to the inhibition of the above reaction. Lipid analyses of livers of control and hydrazine-treated mice showed that no significant abnormalities occurred in the distributions of the individual constituents as a result of hydrazine injection at a time that marked changes in amino acid content were noted. (Author)

7A. CHEMICAL ENGINEERING

N66-15989 **Field 7A**
CFSTI Prices: HC$3.00 MF$0.75
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
T EOS OXIDE STUDIES.
Final project rept. 15 Feb - 15 Aug 65.
by R. M. McLouski. 1965, 73p
Contract NAS5-3758
NASA-CR-69681

Descriptors: *Diffusion, *Deposition, *Silicate, *Silicon oxide, *Tetraethyl.

For abstract, see T 66 16.

Y-1502 **Field 7A, 18G**
CFSTI Prices: HC$4.00 MF$0.75
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
MIXING AND SAMPLING ENRICHED 235 U FLUID IN CYLINDRICAL STORAGE CYLINDERS.
Progress rept.
by James E. Harrell. 8 Mar 66, 108p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel enrichment, Uranium), (*Liquid metals, Storage).

For abstract, see N 20 14.

GAT-524 **See Field 18J**

K-1653 **See Field 18B**

MLM-1293 **See Field 18B**

ORNL-3903 **See Field 7E**

7B. INORGANIC CHEMISTRY

AD-634 881 **Field 7B**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., Seattle. Dept. of Chemistry.
THE REACTION OF PEROXYDISULFURYL DIFLUORIDE WITH ANTIMONY PENTACHLORIDE.
Technical rept.
by Ronald E. Noftle, and George H. Cady. 1966, 12p TR-55
Contract Nonr-477, ARPA Order-26-60
Task 2

Descriptors: (*Antimony compounds, Chemical reactions), (*Sulfates, Synthesis (Chemistry)), (*Fluorine compounds, Chemical reactions), Chlorides, Sulfides, Decomposition, Complex compounds, Peroxides.

Identifiers: Antimonic chloride, Antimony fluorosulfates, Peroxydisulfuryl fluoride.

The reaction of S2O6F2 with SbCl5 proceeded readily in the vicinity of 3C. In reactions involving a mole ratio of S2O6F2:SbCl5 slightly in excess of 2.5:1, an unstable antimony fluorosulfate was formed. This viscous orange liquid contained at least 4 fluorosulfate groups per atom of Sb. The substance slowly decomposed at 25C in vacuo liberating S2O5F2 and SO3. The orange oil was pumped to constant weight at 25C, and the nonvolatile material which remained was a pale yellow solid. The pale yellow solid was found to contain a small amount of chlorine present in a positive oxidation state. In the case of reactions involving a large excess of S2O6F2, the results indicated that a stable antimony compound containing close to 3.5 fluorosulfate groups per atom of antimony was formed. Again chlorine was found to be present in a positive oxidation state, and it is possible that stabilization of the antimony compound occurred through partial formation of a complex R (+) (Sb (SO3F)6-xFx) (-) where R = Cl, ClO, or ClO2. (Author)

RFP-728 **Field 7B**
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
PROCESS STUDIES ON THE REDUCTION OF PLUTONIUM TETRAFLUORIDE TO METAL.
by W. V. Conner. 11 May 66, 25p
Contract AT (29-1)-1106

Descriptors: (*Plutonium compounds, Fluorides), (*Plutonium, Recovery).

For abstract, see N 20 14.

AD-432 272 **See Field 20L**

AD-635 174 **See Field 7D**

PB-170 567 **See Field 13B**

7C. ORGANIC CHEMISTRY

AD-635 103 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Georgia Univ., Athens. Dept. of Chemistry.
A THERMODYNAMIC STABILITY SCALE FOR STABLE, ISOLABLE FREE RADICALS.
Final scientific rept. 1 Oct 61-31 Mar 66.
by Robert C. Lamb, and Carroll T. Clark. 31 Mar 66, 12p
Grants AF-AFOSR-62-53, AF-AFOSR-543-64
AFOSR-66-1409

Descriptors: (*Free radicals, Stability), Thermodynamics, Separation, Organic oxygen compounds, Chemical reactions, Tables.

A summary is given of studies involving the establishment of a stability scale for certain galvinoxyl derivatives, and the use of stable free radicals as scavengers of radicals formed in decompositions of free radicals initiators. The publications resulting from this work are listed.

AD-635 119 **Field 7C, 15B**
CFSTI Prices: HC$1.50 MF$0.75
Ash Stevens, Inc., Detroit, Mich.
HIGH-YIELD REACTIONS TO INTRODUCE ALDEHYDE GROUPS INTO PYRIDINE DERIVATIVES.
Final comprehensive rept. 10 May 65-10 May 66.
by F. A. Daniher, and A. B. Ash. May 66, 61p
Contract DA-18-035-AMC-374 (A)

Descriptors: (*Pyridines, Oxidation), (*Aldehydes, Synthesis (Chemistry)), Oxides, Reduction (Chemistry), Nitriles, Sulfonates, Methanols, Oximes, N-heterocyclic compounds.

Identifiers: Pyridine aldoximes, Rearrangement reactions, Chemical warfare therapeutic agents.

The mechanism of the deoxygenation of 5-ethyl-2-picoline N-oxide with benzyl sulfonyl chloride was elucidated. Two new methods for the deoxygenation of pyridine N-oxides were discovered. The sulfonyl chloride rearrangement of 2-picoline N-oxides was extended to include sulfonic acid anhydrides and sulfonyl bromides. The selective reduction of cyanopyridines to pyridinecarboxaldehydes with Raney nickel was investigated. The conversion of 2-pyridinemethanols to their oximes via the 2-sulfonate esters was demonstrated. The oxidation of 2-pyridine methanols to the corresponding aldehydes with manganese dioxide gave moderate yields. Oxidation of 2-pyridine methanols with t-butyl hypochloride gave the aldehyde in yields of 45 to 57%. 2-Pyridine aldoxime methochloride was prepared from 2-pyridine methanol by a new sequence involving (1) quaternization with methyl iodide, (2) conversion to the 2-chloromethyl analog with thionyl chloride and (3) reaction with hydroxylamine; the overall yield was 56%. The conversion of 4-picoline N-oxide to 4-pyridine aldoxime via anil formation, acid hydrolysis, and oxime formation was successful. (Author)

AD-635 221 **Field 7C**
CFSTI Prices: HC$6.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
CHEMISTRY OF ORGANOMETALLIC COMPOUNDS. PART A. ORGANOSILICON AND ORGANOGERMANIUM CHEMISTRY: ANNOTATED BIBLIOGRAPHY.
Rept. no. 1 on ATD work assignment no. 79, task 24.
by Edward Wolski. 20 Apr 66, 111p ATD-66-47
TT66-61678
Based on Soviet-Satellite open sources pub. 1964. Rept. on Surveys of Communist World Scientific and Technical Literature.

Descriptors: (*Metalorganic compounds, Reviews), (*Silicon compounds, Reviews), (*Germanium compounds, Reviews), Silanes, Siloxanes, Chemistry, Abstracts, Bibliographies, USSR, Poland, Czechoslovakia.

Identifiers: Germanes.

This annotated bibliography was compiled from Soviet-Satellite open sources published in 1964. It deals with organosilicon and organogermanium chemistry, excluding entries for silicones and/or germanium in polymer molecules. Only entries concerning experimental chemistry were selected for inclusion; general reviews were not considered. The report consists of a compilation of abstracts, annotations, and book exploitations and is divided into two chapters: Chapter I, Organosilicon compounds, comprising 107 entries; and Chapter II, Organogermanium compounds, with 22 entries. Available formulas and data were included in the annotations. All entries are arranged alphabetically by author, and each chapter is provided with author and association indexes. Appended to the report is a list of journals used in the report. (Author)

AD-635 299 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.75
Colorado Univ., Boulder.
NITROSO AND NITRO FLUOROHALOALKANES.
Final rept. 1 May 61-1 May 64.
by J. D. Park, and J. R. Lacher. 1 May 64, 82p
Grant DA-ARO (D)-31-124-G69
Proj. DA-3027-C, DA-20014501B13A
AROD-3027:1

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Fluorine compounds, Halogenated hydrocarbons), (*Organic nitrogen compounds, Synthesis (Chemistry)), Polymers, Alkanes, Nitrites, Reaction kinetics, Statistical mechanics, Thermodynamics, Vapor pressure, Acetones, Catalysts.

The report summarizes work in a program which was primarily concerned with the study of new approaches to the syntheses of of polyhalonitrosoalkanes and similarly related derivatives. Another objective was the study of various inorganic compounds as possible catalysts for the addition of NO, NO2 and NOCl across olefinic bonds. The kinetics of decarboxylation of some acyl nitrites were investigated. Vapor pressure measurements were also made in order to obtain the latent heats of vaporization as well as values for the Trouton's constant. (Author)

UCRL-14714 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
PREPARATION AND PROPERTIES OF 2,4-DINITROPHENYL FLUOROALKYL ETHERS.
by Eugene R. Bissell, and Sheldon A. Schaffer.
25 Feb 66, 8p
Contract W-7405-eng-48

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Phenyl ethers, Synthesis (Chemistry)).

For abstract, see N 20 14.

AD-634 782 **See Field 11G**

AD-634 859 **See Field 7E**

AD-634 982 **See Field 11I**

AD-635 011 **See Field 7D**

AD-635 217 **See Field 7E**

AD-635 257 **See Field 5A**

7D. PHYSICAL CHEMISTRY

AD-400 677 **Field 7D**
CFSTI Price: HC$2.60
Avco Everett Research Lab., Everett, Mass.
VIBRATIONAL WAVE FUNCTIONS AND OVERLAP INTEGRALS OF VARIOUS BAND SYSTEMS.
by D. R. Childs. Jan 63, 27p Research rept. RR-147
Contract DA-19-020-ORD-5476

Descriptors: (*Diatomic Molecules, Band spectrum), (*Band spectrum, Wave functions), (*Wave functions, Diatomic molecules), (*Molecular energy levels, Integral), Potential theory, Polynomials, Excitation, Vibration, Molecular spectroscopy.

The vibrational wave functions of a diatomic molecule were calculated for a Morse potential. A generating function for the polynomials was obtained which enables one to derive recursion relationships among the polynomials. With the aid of these recursion relationships overlap integrals between the various vibrationally excited electronic states were calculated for a Morse potential and a general expression was obtained. Overlap integrals are exhibited for low vibrational quantum numbers for fifteen band systems. (Author)

AD-457 280 **Field 7D**
CFSTI Price: HC$4.00
Royal Aircraft Establishment, Farnborough (England).
NOTES ON THE THIRD INTERNATIONAL MASS SPECTROMETRY CONFERENCE HELD AT PARIS, FRANCE, SEPTEMBER 14TH-18TH, 1964.
by J. L. Cotter. Nov 64, 13p Technical rept. TR-64062

Descriptors: (*Mass spectroscopy, Symposia), Thermochemistry, Organic chemistry, Chemical analysis.

AD-634 780 **Field 7D, 20J, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
ON A CONTINUED FRACTION OCCURRING IN THE THEORY OF ONE-ELECTRON DIATOMIC MOLECULES,
by A. M. Arthurs. 20 May 66, 7p WIS-TC1-173
Contract DA-11-022-ORD-2059, Grant NsG-275-62

Descriptors: (*Diatomic molecules, *Continued fractions), Molecular energy levels, Theory, Special functions (Mathematical).

The theory of hypergeometric functions is used to obtain a closed form for a continued fraction arising in the work of Byers Brown and Steiner on the electronic energy of a one-electron diatomic molecule near the united atom. (Author)

AD-634 799 **Field 7D, 20I, 4A**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
COLLISION FREQUENCIES AND ENERGY TRANSFER-IONS,
by Peter M. Banks. 15 May 66, 40p
Grant Nonr (G)-00009-66

Descriptors: (*Kinetic theory, Ionosphere), (*Plasma physics, *Ionosphere), (*Ions, Kinetic theory), Exchange reactions, Kinetic energy, Hydrogen, Oxygen, Nitrogen, Helium, Atomic properties.

An investigation has been made of ion collision frequencies and energy transfer for conditions of gaseous thermal nonequilibrium. Following the methods of a development devoted to electron collisions, the problems of ion-neutral and ion-ion elastic collisions have been considered under the assumption of separate Maxwellian velocity distributions. Expressions for the nonequilibrium momentum transfer cross sections, collision frequencies, and energy transfer rates are given for neutral gases on the basis of a polarization potential and for ions on the basis of the Coulomb interaction. Next, the problem of ion-neutral resonance charge exchange is introduced in its effect upon collision cross sections and ion energy transfer rates. An analysis is made of gathered laboratory data to arrive at suitable expressions for the resonance charge exchange and momentum transfer cross sections for H (+), O (+), He (+), N2 (+), and O2 (+). Using these results, resonance charge exchange and momentum transfer collision frequen-

cies are derived. The resonance ion-neutral energy transfer rates are then compared with expressions used in previous studies of ion temperatures. (Author)

AD-634 954 **Field 7D, 4A, 20I**
CFSTI Prices: HC$1.00 MF$0.50
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Physics.
IONIZATION AND DISSOCIATIVE IONIZATION OF O2 AFTER ELECTRON AND ION IMPACT.
by H. Sjogren, and E. Lindholm. 15 Dec 65, 26p Scientific-4
Contract AF 61 (052)-762
Proj. AF-7635
Task 763504
AFCRL-66-436

Descriptors: (*Oxygen, *Gas ionization), Dissociation, Electron bombardment, Ion bombardment, Mass spectrum, Probability, Silicon, Atomic energy levels, Upper atmosphere, Sweden.

The ionization of O2 was investigated by using charge exchange in a double mass spectrometer. The breakdown graph was constructed. A break in the electron impact ionization efficiency curve is explained as being due to ion-molecule geactions between excited O (+) ions formed in an ion-pair process, and O2. It is shown that the cross sections must be very small for the reaction O (+) (quadruplet-S) + O2 to O + O2 (+) since the cross sections for the corresponding reaction with Si (+) are small. Implications for the aeronomy are discussed. (Author)

AD-635 011 **Field 7D, 7C**
Suffield Experimental Station, Ralston (Alberta).
PARTITION COEFFICIENTS OF SOME CONJUGATED HETEROENOID COMPOUNDS AND 1,4-NAPHTHOQUINONES.
Technical paper.
by D. J. Currie, C. E. Lough, R. F. Silver, and H. L. Holmes. 8 Sep 65, 9p Suffield-TP-317
Proj. DRB-D52-20-20-28

Descriptors: (*Sovent extraction, Mathematical prediction), (*Styrenes, Solvent extraction), (*Nitrobenzenes, Solvent extraction), (*Quinones, Solvent extraction), Organic nitrogen compounds, Solutions, Polycyclic compounds, Solvents, Canada.

Identifiers: Naphthoquinones, Nitro butenyl benzenes, Nitro propenyl benzes, Nitro styrenes, Partition coefficients.

The concept of additive constants to predict the partition coefficient of a compound has been developed and applied to 244 compounds. Some of the limitations of such a concept are discussed. (Author)

AD-635 032 **Field 7D, 6A, 10A**
CFSTI Prices: HC$3.00 MF$0.75
Weizmann Inst. of Science, Rehovoth (Israel).
MECHANOCHEMISTRY OF COUPLED CONTRACTILE AND CHEMICAL RATE PROCESSES.
Final rept., 1 Jan 64-31 Dec 65.
by A. Katchalsky. 31 Dec 65, 67p
Grant AF-EOAR-25-64
AFOSR-66-1181

Descriptors: (*Contraction, Chemistry), (*Reaction kinetics, Contraction), (*Engines + motors, Contraction), (*Collagen, Contraction), Thermodynamics, Energy conversion, Power, Equations of state, Salts, Lithium compounds, Bromides, Spectra (Infrared), X-ray diffraction analysis, Force, Fibers, Vibration.

Identifiers: Mechanochemical engines, Mechanochemistry, Fused materials.

Contents: Summary of work under the contract; Chemomechanical and mechanochemical transformations (abstract); Mechanochemical engines; Measurements on power and efficiency of a mechanochemical engine; The equation of state of chemically molten collagen fibers (Abstract); Changes in the infrared absorption spectrum of collagen due to the interaction with LiBr; An X-ray investigation of the mechanochemical melting of collagen (Abstract); The relation between force and rate of contraction in collagen fibers in the presence of contractile salt; The vibrating reed technique.

AD-635 097 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Mississippi Univ., University.
TRANSLATION TO VIBRATION TRANSITION PROBABILITIES IN CO2-H2 AND CO2-He COLLITIONS.
Technical rept.
by James W. L. Lewis, and F. Douglas Shields.
1 Jul 65, 39p
Contract Nonr-3078 (01)
Proj. NR-384-307
Rept. on Thermal Relaxation Processes In Gases.

Descriptors: (*Carbon dioxide, Transport properties), (*Hydrogen, Transport properties), (*Helium, Transport properties), Chemical bonds, Vibration, Transformations, Probability, Temperature.

The probability of a collision transferring energy from translation to vibration generally increases with relative speeds with which the molecules collide. Measured transition probabilities, therefore, generally increase with temperature. Some years ago this expected temperature effect was observed to fail for CO2-H2O, CO2-H2 and CO2-He collisions. Widom and Bauer proposed an explanation for the first of these in terms of a chemical affinity between the CO2 and H2O molecules but their theoretical results were in disagreement with the experimental values available at the time. Recent experimental results have brought measured values more nearly in line with the Widom-Bauer calculations. This paper describes similar calculations for the CO2-H2 system and reports experimental results that indicate the collision efficiency for CO2-He increases normally with temperature. (Author)

AD-635 098 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Mississippi Univ., University.
MULTIPLE VIBRATIONAL RELAXATION IN GASEOUS SULFUR DIOXIDE.
Technical rept.
by F. D. Shields. 1 Jul 66, 25p
Contract Nonr-3078 (01)
Proj. NR-384-307

Descriptors: (*Sulfur compounds, Dioxides), (*Ultrasonic radiation, Absorption), (*Polyatomic molecules, Vibration), Chemical bonds, Relaxation time, Argon, Sound, Velocity.

Identifiers: Sonochemistry, Sulfur dioxide.

Sound absorption and velocity measurements have been made in pure SO2 and mixtures of 25 and 50% Ar with SO2 at room temperature, 400K and 500K. The results confirm earlier reports of a multiple relaxation process. The data has been fit with both series and parallel relaxation curves and the temperature dependence of the individual relaxation times determined. The difficulty in distinguishing between the two process is discussed. (Author)

AD-635 153 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
CHEMICAL REACTIONS ON CLEAN SURFACES, USING MODULATED ATOMIC BEAM TECHNIQUES.
Annual technical summary rept. 1 Apr 65-31 Mar 66.
by Howard Saltsburg, and Joe N. Smith Jr. 26 Apr 66, 21p GA-7108
Contract AF 49 (638)-1559
Proj. 506
AFOSR-66-1360

Descriptors: (*Catalysis, Surface properties), (*Molecular beams, Chemical reactions), Reaction kinetics, Surfaces, Adsorption, Hydrogen, Deuterium, Exchange reactions, Evaporation, Deposition.

The design of a molecular beam experiment to study chemical reactions on clean metal surfaces is described. The motivation for the particular approach to the attainment of clean surfaces and surfaces with a controlled concentration of surface adsorbate is discussed. Finally, the results of the first 12 months effort on this program are summarized, and certain experimental problem areas are discussed. (Author)

AD-635 174 **Field 7D, 20L, 14B, 7B K**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Research Labs., Pittsburgh, Pa.
A STUDY OF X-RAY ABSORPTION EDGE SPECTROSCOPY AS A TOOL FOR SOLID-STATE CHEMICAL RESEARCH.
Final technical rept., 1 Feb 64-31 Jan 66.
by Armand J. Panson. 31 Jan 66, 38p
Contract Nonr-4463 (00)

Descriptors: (*X-ray spectroscopy, Feasibility studies), (*Iron compounds, X-ray spectroscopy), (*Cyanides, Line spectrum), Spectrum analyzers, Copper compounds, Valence, Lanthanum compounds, Cobalt compounds, Strontium compounds, Mossbauer effect, Complex compounds, Ions.

Progress in the following areas is reported (the first 3 items are summarized briefly - a detailed report having been given in AD-610 719): (1) Design and development of a novel monitored beam x-ray absorption spectrometer arrangement to solve the intensity stabilization problem. (2) Observation of covalency effects in the spectrum of several copper compounds. (3) Investigation of valence changes associated with conductance and magnetic anomalies in LaCoO3. (4) A study of the sensitivity of absorption edge position to valence in a series of iron compounds. (5) Investigation of the tetravalent oxidation state of iron. (6) Investigation of 'white-line' spectra in some cyanides and study of relative intensity fluctuations with bonding 'p' character. (Author)

AD-635 219 **Field 7D, 4A**
CFSTI Prices: HC$1.50 MF$0.75
Westinghouse Research Labs., Pittsburgh, Pa.
STUDIES AND EXPERIMENTAL WORK ON ATOMIC COLLISION PROCESSES OCCURING IN ATMOSPHERIC GASES.
Research rept. for 22 Dec 64-22 Dec 65.
by A. V. Phelps, and W. H. Kasner. May 66, 73p 66-6E2-GASES-R1
Contract AF 29 (601)-6729
Proj. AF-5710
AFWL-TR-66-34

Descriptors: (*Air, Gas ionization), (*Atmosphere, Chemical reactions), Electrons, Ions, Recombination reactions, Oxygen, Electron bombardment, Inelastic scattering, Probability, Nitrogen, Reaction kinetics, Mass spectrum.

Temperature dependent recombination studies in nitrogen were conducted over the range 200-480K, yielding a coefficient of (2.9 plus or minus 0.3) x 0.0000001 cu cm/sec for the recombination of N2 (+) ions and electrons. The observed temperature dependence is quite small, being adequately described by the relation T exp.-0.02. Several modifications have been made on the flow system used in the study of associative detachment in O2-O mixtures. In subsequent studies a reaction

resembling associative detachment was observed. While preliminary tests were being conducted on the rf mass spectrometer which is to be used on the flow system, a brief study of negative ion-molecule reactions was made. Rate coefficients for several of these reactions were measured. A summary of the results of a calculation of momentum transfer and inelastic cross sections for electrons in oxygen is presented. The computed momentum transfer cross section is in satisfactory agreement with electron beam results but it differs significantly from the cross section obtained at thermal energies from microwave experiments. (Author)

AD-635 296 **Field 7D, 211**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Bartlesville, Okla. Petroleum Research Center.
THERMODYNAMIC PROPERTIES OF ORGANIC DERIVATIVES OF THE LIGHTER ELEMENTS.
Annual technical summary rept., 1 Mar 65-1 Mar 66.
by D. R. Douslin. 1 Mar 66, 27p
Grant ISSA-65-7
Proj. AF-9713
Task 971302
AFOSR-66-1389

Descriptors: (*Boranes, Thermochemistry), (*Metalorganic compounds, Thermochemistry), (*Halogenated hydrocarbons, Thermochemistry), (*Amines, Thermochemistry), Aluminum compounds, Borohydrides, Lithium compounds, Benzenes, Heat of formation, Enthalpy, Heat of reaction, Phase studies, Specific heat, Fluoroamines, Chemical bonds, Heat of vaporization, Fuels, Fluorine compounds.

Identifiers: Aluminum borohydride, Diamines, Heat capacity, Heat of combustion, Free energy, Hexafluoro benzenes, Organic lithium compounds, Triethylamine boranes, Trimethylamine boranes.

Thermochemical research was carried out on trimethylamineborane, triethylamineborane, aluminum borohydride, lithium alkyls, hexafluorobenzene, and diamines. Results presented for trimethylamineborane and triethylamineborane include: enthalpies of combustion and formation, molal heat capacities of the condensed phases, phase transformation and melting point temperatures, third law entropies, Gibbs energies and equilibrium constants of formation. A scheme was developed for an improved evaluation of the N-F thermochemical bond energy through experimental determinations of the enthalpies of combustion of the related diamines. The status of work on aluminum borohydride and the lithium alkyls was reviewed. Experimental measurements on the enthalpies of vaporization and vapor heat capacity of hexafluorobenzene were completed. (Author)

AD-635 373 **Field 7D, 20L, 3B**
CFSTI Prices: HC$3.00 MF$0.50
Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Progress rept. no. 13, 1 Nov 65-30 Apr 66.
by R. Novick. 30 Apr 66, 101p CU-4-66-AMC-00099 (E) Physics
Contract DA-28-043-AMC-00099 (E)
Proj. DA-1A0-10501-B010
Continuation of Contract DA-36-039-sc-90789.
See also AD-628 089.

Descriptors: (*Radiofrequency spectroscopy, Potassium), (*Solid state physics, *Spectroscopy), Molecular spectroscopy, Gas ionization, Lasers, Line spectrum, Hyperfine structure, Lithium, Atomic spectroscopy, Cesium, Microwave spectroscopy, Magnetic resonance, Ruby, Planetary atmospheres, Spectra (Visible + ultraviolet), Refraction, Relaxation time, Molecular beams, Atomic energy levels.

The magnetic resonance technique was applied to observe the radio-frequency Zeeman transition lines of metastable autoionizing states in potassium. Field sweeps made at different frequencies ranging from 10 Mc/sec to 40 Mc/sec showed a linear increase in transition field values as expected for low-field Zeeman transitions. The gF values deduced from the transition lines indicate the existence of two metastable excited states, the 4F9/2 and 4D7/2 states. Earlier resonant self-broadening data for the (6s26p7s)3P10 state of lead was corrected for temperature variations over the surface of the cell. The differential Stark shift of the mJ = + or - 3/2 and mJ = + or - 1/2 sub-levels of the 72P3/2 state of cesium was measured by crossing the hfs levels in a pure electric field. The value obtained is alpha/h=1.077 + or -0.043 (c/sec)/sq (kV/cm). A series of measurements of microwave absorption in mixtures of water vapor and nitrogen were made. Absorption was measured at 9260 Mc/sec at temperatures from 120C to 200C and at pressures up to 130 atmospheres. Water vapor content ranged from 0.3% to 1.5%. (Author)

AD-635 469 **Field 7D, 11F, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Arizona state Univ., Tempe. Dept. of Chemistry.
SOLUBILITY AND DIFFUSION OF HYDROGEN IN METALS AND ALLOYS. I - MONOCRYSTALLINE NICKEL-VANADIUM ALLOY.
Technical rept.
by Y. Ebisuzaki, W. Kass, and M. O'Keeffe. 1 Jul 66, 15p TR-4
Contract Nonr-2794 (04)
Proj. NR-056-450

Descriptors: (*Hydrogen, Nickel alloys), (*Nickel alloys, Vanadium alloys), Diffusion, Solubility, Permeability, Single crystals, Heat of solution, Transition elements.

A method for measuring the solubility and diffusion coefficient of hydrogen in metal single crystals under clean conditions is described. For a nickel - 4.4 atom % vanadium alloy the diffusion coefficient is (7.2 plus or minus 0.4) x 0.0001 exp (-10.10 plus or minus 0.06 kcal/RTsq cm/sec and the solubility in atom H per atom of alloy is (1.12 plus or minus 0.05) x 0.001 exp (-2.09 plus or minus 0.05 kcal/RT). (Author)

ANL-7146 **Field 7D, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
A METHOD FOR COMPUTER ANALYSIS OF THE FORMATION CURVE OF A TRANSIENT, WHERE CONCURRENT REACTIONS CAUSE CONSUMPTION OF THE TRANSIENT.
by Myran C. Sauer, Jr. Jan 66, 26p
Contract W-31-109-eng-38

Descriptors: (*Transients, Reaction kinetics), (*Programming (Computers), Chemical reactions).

For abstract, see N 20 14.

N66-16401 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania Univ., Philadelphia. Electrochemistry Lab.
STUDIES IN FUNDAMENTAL CHEMISTRY OF FUEL CELL REACTIONS.
Quarterly progress rept. 1 Jul-30 Sep 65.
by J. O. M. Bockris. 1965, 72p
Grant NsG-325
NASA-CR-69855

Descriptors: *Electrolysis, *Platinum, *Electrochemical cell, *Electrode.

PB-170 355 **Field 7D, 14B**
CFSTI Price: MF$0.50
Forest Products Lab., Madison, Wis.
SPREADER FOR THE PREPARATION OF UNIFORM PLATES FOR THIN-LAYER CHROMATOGRAPHY.
Research note.
by W. E. Moore, and M. J. Effland. Feb 66, 5p
EPL-0119

Descriptors: (*Chromatographic analysis, Films), (*Films, Preparation), Laboratory equipment.

The paper describes a spreader which produces uniform layers on commercially available glass plates and is easy to use, clean, and maintain. Plates made with this spreader have a very smooth texture and are uniform in thickness. When the thickness of the deposited layer was 0.006 inch, measurements made with a paper micrometer revealed a standard deviation across the plate of 0.00019 inch and in the machine direction the standard deviation was 0.00014 inch.

AD-437 796 See Field 4A

AD-441 139 See Field 4A

AD-462 001 See Field 5A

AD-634 779 See Field 20J

AD-634 811 See Field 20F

AD-634 813 See Field 11F

AD-634 820 See Field 20L

AD-634 846 See Field 10B

AD-634 867 See Field 21B

AD-634 918 See Field 3B

AD-635 040 See Field 14B

AD-635 159 See Field 21B

AD-635 161 See Field 21B

AD-635 504 See Field 3B

NBS-TN-286 See Field 14B

ORNL-3947 See Field 18J

7E. RADIO AND RADIATION CHEMISTRY

AD-634 859 **Field 7E, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
THE CHEMICAL EFFECTS OF IRRADIATED TRIPLE-BOND COMPOUNDS.
Final rept. Mar 62-Dec 65,
by Roger E. Rondeau, and Larry A. Harrah. Apr 66, 58p AFML-TR-66-33
Proj. AF-7367
Task 736701

Descriptors: (*Acetonitriles, Radiation chemistry), (*Propionitriles, Radiation chemistry), (*Alkynes, *Radiation chemistry), Chemical analysis, Electron spin resonance, Mass spectroscopy, Phase studies, Hydrogen, Decomposition, Toxicity, Chemical reactions, Polymerization, Free radicals, Nitriles.

The radiation chemistry of acetonitrile, propionitrile, and fifteen alkynes was studied using three different experimental approaches: product analysis (PA), electron spin resonance spectrometry (ESR), and mass spectrometry (MS). The results of each study are discussed in terms of reactions proceeding through energetic intermediates. The ESR and MS studies discuss the intermediates responsible for the product distribution found in the PA study. Topics of discussion include phase effects, extent of hydrogen evolution, toxic product yields, cyclization reactions, induced polymerization, and radiation protection. (Author)

AD-634 912 **Field 7E**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
COBALT-60 RADIOLYSIS OF SOLID ETHYL IODIDE.
Technical rept. for Sep 64-Apr 65.
by G. L. Hermann, and L. A. Harrah. Apr 66, 32p
AFML-TR-65-333
Proj. AF-7367
Task 736701

Descriptors: (*Halogenated hydrocarbons, Radiation chemistry), (*Iodine compounds, Radiation chemistry), Gamma rays, Cobalt, Free radicals, Paramagnetic resonance, Hydrocarbons, Ethanes, Iodides, Decomposition, Spectroscopy, Glass, Crystals, Cryogenics, Solids.

Identifiers: Ethyl iodides.

Glass and polycrystalline ethyl iodide at 77K were irradiated with cobalt 60. Yields of free radicals were measured with an electron paramagnetic resonance spectrometer. G values for radicals in glass and polycrystalline phases were 1.53 and 0.33. Hydrocarbon reaction products were separated by Toepler pumping and measured with a mass spectrometer. Products containing iodine were measured by spectrophotometric methods. Ethene-ethane and hydrogen iodide-iodine product ratios were much higher in the polycrystalline phase than in the glass phase, and higher in the glass phase than in previous results from the liquid phase. (Author)

AD-635 142 **Field 7E, 11G**
CFSTI Prices: HC$4.00 MF$0.75
American Cyanamid Co., Stamford, Conn. Central Research Div.
CHEMILUMINESCENT MATERIALS.
Technical progress rept. no. 12, 1 Mar-31 May 66.
by M. M. Rauhut, L. J. Bollyky, R. A. Clarke, D. R. Maulding, and B. G. Roberts. 31 May 66, 117p
Rept. no. 06-1432-25-Q12
Contract Nonr-4200 (00), ARPA Order-299
Proj. NR-356 452
See also AD-632 220.

Descriptors: (*Lighting equipment, Ciemiluminescence), (*Chemiluminescence, Materials), (*Oxalates, Chemiluminescence), Syntheses (Chemistry), Esters, Amides, Chemical reactions, Additives, Fluorescence, Reaction kinetics, Deroxides, Hydrogen peroxide, Quenching (Inhibition), Storage, Stability.

Identifiers: Oxamides, Quantum yields.

Current results of a program designed to provide efficient peroxyoxalate chemiluminescent systems are described. The synthesis and chemiluminescent properties of a number of new chemiluminescent oxalate esters and amides are reported. Reaction condition studies relating to the effects of reactant concentrations and the effects of certain additives are discussed. The qualitative chemiluminescence efficiencies of a large number of fluorescers are summarized. (Author)

AD-635 217 **Field 7E, 7C**
CFSTI Prices: HC$4.00 MF$0.50
Tulane Univ., New Orleans, La. Dept. of Chemistry.
PHOTOCHEMISTRY OF UNSATURATED CARBONYL DERIVATIVES AND RELATED SMALL RING SYSTEMS.
Final rept. 1 Jul 63-31 Dec 65.
by Gary W. Griffin. 1 Jun 66, 29p
Contracts DA-31-124-ARO (D)-130, DA-31-124-ARO (D)-182
Proj. DA-20014501B13A
AROD-4375:11

Descriptors: (*Monocyclic compounds, *Photochemistry), (*Heterocyclic compounds, Photochemistry), (*Polycyclic compounds, Photochemistry), Alkenes, O-heterocyclic compounds, Cyclopropanes, Cyclobutanes, Chemical reactions, Cycloalkenes, N-heterocyclic compounds, Photolysis.

Identifiers: Carbenes, Cyclopropenes, Epoxides, Oxiranes, Phenyl carbenes, Rearrangement reactions.

The photofragmentation of a variety of small ring homo- and heterocyclic systems including cyclopropanes, epoxides, aziridines, oxaziranes and episulfides were studied. The photorearrangement of cyclopropanes to olefins and the photoinduced conversion of cyclopropenes to indenes were also examined. The studies are complementary and those parameters which determine the reaction course are defined in each case. For example, it is of interest to determine why certain cyclopropanes fragment to carbenes and others simply rearrange to isomeric olefins. Many of those reactions described have synthetic utility and heretofore inaccessible systems were synthesized. The photofragmentation of stilbene oxide is illustrative and appears to be the method of choice for preparing phenylcarbenes and thus phenylcyclopropanes and cyclopropenes. (Author)

ANL-6953 **Field 7E, 18D**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
DETECTION SENSITIVITIES IN THERMAL-NEUTRON ACTIVATION.
by James Wing, and Morris A. Wahlgren. Dec 65, 106p
Contract W-31-109-eng-38

Descriptors: (*Thermal neutrons, Neutron activation), (*Radiation measurement systems, Radiochemistry).

For abstract, see N 20 14.

NLCO-973 **Field 7E, 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Lead Co. of Ohio, Cincinnati.
RAPID DETERMINATION OF OXYGEN IN HIGH-PURITY MAGNESIUM CHIPS BY NEUTRON ACTIVATION ANALYSIS.
by B. L. Twitty, and K. M. Fritz. May 66, 23p
Contract AT (30-1)-1156

Descriptors: (*Neutron activation, Oxygen), (*Magnesium, Neutron activation).

For abstract, see N 20 14.

ORNL-3903 **Field 7E, 18B, 7A**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
ION-EXCHANGE SEPARATION OF CURIE QUANTITIES OF 90 Y FROM 90 SR WITH DTPA AND HEDTA.
by P. B. Orr. May 66, 20p
Contract W-7405-eng-26

Descriptors: (*Yttrium, Isotope separation), (*Isotope separation, Strontium).

For abstract, see N 20 14.

PB-470 908 **Field 7E, 6Q**
CFSTI Prices: HC$8.60 MF$0.75
TRW Systems, Redondo Beach, Calif. Chemical Sciences Dept.
RESEARCH ON TRIPLET STATES AND PHOTOCHROMISM FOR FLASH-BLINDNESS PROTECTION.
Annual research rept. no. 6, 25 Jan 64-30 Apr 65.
by M. W. Windsor, W. R. Dawson, R. S. Moore, and D. Weber. 30 Apr 65, 83p Rept. no. 4162-6004-RUOOO
Contract AF 41 (609)-2425
Proj. AF-5710
Task 03.006
See also AD-434 239.

Descriptors: (*Flashblindness, Optical filters), (*Photochromism, Aromatic compounds), (*Molecular energy levels, Photochromism), Absorption, Light, Photochemistry, Excitation, Spectrum (Visible+ultraviolet), Plastics, Acrylic resins, Ultraviolet radiation, Plastic coatings, Polyvinyl alcohol, Degradation, Polycyclic compounds.

A method of measuring extinction coefficients of triplet absorption and quantum yields of triplet formation was developed. Combinations of aromatic compounds giving strong triplet absorption of visible light over the visible spectrum with minimized excitation energy are selected on the basis of these results. New plastics having greater solubility for large aromatic molecules than polymethylmethacrylate were found. A method of making large sheets of polymethylmethacrylate with exceptionally high transparency to ultraviolet light is described. Deleterious effects of exposure of plastics, with and without aromatic solutes, to oxygen and sunlight were studied. It was shown that diffusion of oxygen into the plastic sheets may be greatly reduced by a polyvinyl-alcohol coating. The application of these experimental results to the design of a protection device against flash blindness is discussed.

WCAP-6068 **Field 7E, 18J**
CFSTI Prices: HC$5.00 MF$1.00
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
EVALUATION OF MASS SPECTROMETRIC AND RADIOCHEMICAL ANALYSES OF YANKEE CORE I SPENT FUEL.
by R. J. Nodvik. Mar 66, 181p
Contract AT (30-1)-3017

Descriptors: (*Reactor system components, Radiochemistry), (*Mass spectroscopy, Spectrum analyzers).

For abstract, see N 20 14.

AD-462 346 See Field 10B

AD-634 905 See Field 20L

AD-635 039 See Field 4A

AD-635 088 See Field 18H

AD-635 143 See Field 9E

8A. BIOLOGICAL OCEANOGRAPHY

AD-635 140 **Field 8A**
CFSTI Prices: HC$1.00 MF$0.50
Narragansett Marine Lab., Univ. of Rhode Island, Kingston.
BIOLOGICAL PRODUCTIVITY PROJECT.
Final rept.
by David M. Pratt. Jun 66, 8p
Contract Nonr-396 (03)
Proj. NR-104-100

Descriptors: (*Narragansett Bay, *Marine biology), Ecology, Environment, Plankton, Bacteria, Growth, Sedimentation, Temperature, Water, Oxygen, Measurement, Errors, Escherichia coli, Mortality rates, Light, Intensity, Diurnal variations, Periodic variations, Adaptation (Physiology), Inhibition, Nitrates, Silicates, Nutrition.

Several studies on natural populations in Narragansett Bay, R. I., were completed: The growth of Venus mercenaria was shown to be positively correlated with water temperatures between 10 and 23C, and with the abundance of small diatoms, and inversely related to the silt-clay content of the sediment. Two sources of error in the oxygen method for measuring primary production were identified and measured: bacterial respiration, and changes in the enclosed phytoplankton population. Mortality rates of Escherichia coli were especially high when cultured in water taken from the Bay during the terminal phase of Skeletonema costa-

tum blooms. Studies of the spectral sensitivity and depth distribution of Neomysis americana showed that this animal has a strong preference for blue-green light, its diurnal vertical magration is controlled by light intensity, and the dawn rise (which occurs only during the short-night months) is inhibited during the long-night months because the animals become dark adapted. Seasonal changes in the abundance and species composition of the Bay phytoplankton and zooplankton are described. The winter-spring diatom flowering lasts from January to May. Its inception is triggered by the release of zooplankton grazing pressure, and its magnitude is regulated by the concentrations of nitrate and silicate at the beginning of logarithmic growth. (Author)

AD-635 461 **Field 8A**
CFSTI Prices: HC$1.50 MF$0.50
Naval Oceanographic Office, Washington, D. C.
COMPREHENSIVE INVESTIGATIONS OF LUMINESCENCE IN THE SEA DURING SCIENTIFIC EXPEDITIONS.
by N. I. Tarasov, and I. I. Gitelzon. 1966, 9p
Trans-255
TT-66-61770
Kompleksnye Issledovaniya Svecheniya Morya V Nauchnoi Ekspeditsii, trans. of Adademiya Nauk SSSR. Okeanograficheskaya Komissiya. Byulleten. n8 p75-80 1961.

Descriptors: (*Luminescence, *Marine biology), Sea water, Optical properties, Oceanology, USSR.

Identifiers: Bioluminescence.

The level and scope of investigation of marine luminescence in the Soviet Union and the United States is compared. The great interest of American oceanographers in the phenomenon and their achievements are underscored. In order to elucidate the complex nature of bioluminescence, the authors urge to intensify investigations and construct charts of the distribution of luminescent organisms in vertical and horizontal directions, of intensity of bioluminescence, its variations in various taxonomic groups at various depth levels, and hydrological seasons, etc. (Author)

AD-635 479 **Field 8A, 17A**
CFSTI Prices: HC$6.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
PHYSIOLOGICAL DYNAMICS OF SIPHONOPHORES FROM DEEP SCATTERING LAYERS.
Research and development rept. Nov 64-Aug 65.
by G. V. Pickwell. 20 Apr 66, 49p NEL-1369
Proj. SR-011-01-01
Task 0401 (NEL Z12051)

Descriptors: (*Aquatic animals, Physiology), (*Invertebrates, Physiology), Gases, Hydrostatic pressure, Sound signals, Scattering, Oxygen consumption, Carbon monoxide, Diffusion.

Identifiers: Coelenterates, Deep scattering layers, Siphonophores.

Effects of siphonophores on sound propagation in the sea were studied by determining the size of gas bubbles they contain and produce, and the times, volumes, and rates involved in these processes. Major findings were: (1) gases contained in fresh siphonophore floats are generally close to ambient pressure, suggesting release of many bubbles during vertical ascent; (2) oxygen consumption may be elevated during production of CO; (3) diffusion constants for siphonophore floats are close to those for chitin: (4) calculated energy requirements for countering hydrostatic pressures indicate that float refilling times are probably no more than a few hours. (Author)

AD-634 835 **See Field 6A**

AD-635 521 **See Field 13J**

8B. CARTOGRAPHY

AD-634 915 **Field 8B, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Ballistic Research Labs., Aberdeen Proving Ground, Md.
STRIP TRIANGULATION COMPUTER PROGRAM.
by Lila M. Butler. Mar 66, 127p Rept. no. 1318
Proj. DA-1L013001A91A
See also PB-145 274, AD-633 047.

Descriptors: (*Programming (Computers), *Photogrammetry), Geodesics, Aerial photographs.

Identifiers: Triangulation.

For abstract, see T 66 16.

AD-635 476 **Field 8B, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Northwestern Univ., Evanston, Ill. Dept. of Geology.
A COMPARISON OF POLYNOMIAL AND FOURIER MODELS IN MAP ANALYSIS.
Technical rept.
by W. C. Krumbein. Jun 66, 46p TR-2
Contract Nonr-1228 (36)
Proj. NR-388-078

Descriptors: (*Mapping, Numerical methods and procedures), (*Fourier analysis, Mapping), (*Polynomials, Mapping), Series, Maps, Curve fitting, Programming (Computers), Geology, Geography.

The problem of selecting an optimum model for trend analysis of mapped data involves the question of the structure of a single observation under various models. The commonly used polynomial functions structure the data in such a way that a succession of fitted surfaces, linear, quadratic, cubic, etc., can be constructed. The less commonly used but increasingly popular Fourier series model structures the data to produce a series of harmonic surfaces having wave forms of diminishing wave length as the order of the surface rises. Present implications appear to be that when the map shows cyclical forms, the Fourier model is to be preferred. The general problem, however, also includes the question of extrapolating the map beyond the limits of control, and in this respect the polynomial and Fourier models differ very markedly. The present report is an expository study, in which a given set of gridden map data is analyzed with both models, and some of the resulting maps are compared. These maps are then extrapolated beyond the grid, and they demonstrate for the example chosen that extrapolation for short distances from low-order polynomial surfaces is more satisfactory than extrapolation from Fourier maps. However, as the order of the polynomial surface rises, the extrapolated values rapidly increase or decrease beyond bound, whereas Fourier maps of all orders display periodic repetition of the pattern in the control grid. (Author)

8C. DYNAMIC OCEANOGRAPHY

AD-635 064 **Field 8C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Oceanographic Office, Washington, D. C.
WATER CIRCULATION IN THE BERING SEA.
by V. S. Arsenev. 1966, 14p Trans-291
TT-66-61656
Tsirkulyatsiya vod Beringvva Morya, trans. of Okeanologicheskie Issledovaniya (USSR) n13 p61-5 1965.

Descriptors: (*Bering Sea, *Ocean currents), Hydrology, Hydrographic surveying, USSR.

Analysis of dynamic charts constructed on the basis of independent data of long-term mean temperature and salinity values for different months shows that, despite the assumed conception, no common cyclonic circulation exists in the Bering Sea surface layer. By the north-western current system, the Sea is divided into two parts essentially different in the water transport: deep-water south-western part with well defin 1 cyclonic circulation and shallow-water north--eastern part with predominating clockwise currents. At great depths of Western as well as Central basins of the Sea, the cyclonic character of water motions prevails. (Author)

8E. GEODESY

AD-459 051 **Field 8E, 22B**
CFSTI Price: HC$4.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE EARTH'S GRAVITY FIELD DEDUCED FROM THE DOPPLER TRACKING OF FIVE SATELLITES,
by W. H. Guier, and R. R. Newton. Dec 64, 50p TG-634
Contract NOw-62-0604-c

Descriptors: (*Astronomical geodesics, Gravity), (*Gravity, Earth (Planet)), (*Satellite tracking systems, Astronomical geodesics), Geodesics, Satellites (Artificial), Polynomials, Doppler systems, Tracking, Harmonic analysis.

Using orbital determinations and data residuals from the Doppler tracking of five satellites, values for the zonal harmonics of odd degree through the ninth, the non-zonal harmonics of all degrees from the second through the eighth, and the sectorial harmonics of degree 13, are deduced. Combining these with values given by King-Hele for the zonal harmonics of even degree, a shape of the geoid is computed and the distribution of the magnitudes of the harmonics is studied. It is found that the harmonics of the geoid have no apparent relation with the harmonics of the topography. It is also found that the harmonic coefficients of the geoid are consistent with random density variations, having negligible spatial correlation beyond about 0.01 R sub e, that begin near the top of the mantle and continue to an undetermined depth. (Author)

AD-459 428 **Field 8E, 22B**
CFSTI Price: HC$1.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
MEASUREMENTS OF THE DOPPLER SHIFT IN SATELLITE TRANSMISSIONS AND THEIR USE IN GEOMETRICAL GEODESY,
by Robert R. Newton. Nov 64, 18p TG-627
Contract NOw-62-0604-c

Descriptors: (*Astronomical geodesics, Satellite tracking systems), (*Doppler effect, Satellite tracking systems), (*Satellite tracking systems, Astronomical geodesics), (*Time-interval counters, Doppler effect), Errors, Instrumentation, Experimental data.

This paper describes a type of equipment that is being developed to measure the time integral of the Doppler frequency received from a satellite, for use in geometrical geodesy. Experimental results of the instrumentation errors obtained with prototype equipment are given, and it is shown that the errors compare favorably with those from the Doppler tracking stations in the TRANET System. Some geometric results obtained with tracking stations located within the continental United States are also given. (Author)

AD-634 927 **Field 8E**
CFSTI Prices: HC$2.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ON THE QUESTION OF DETERMINING NORMAL HEIGHTS.
by V. F. Eremeev. Jun 66, 27p ACIC-TC-1046
TT-666-61651
K Voprosu ob Opredelenii Normalnykh Vysot,

trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii. Trudy (USSR) v157 p69-84 1965.

Descriptors: (*Height finding, *Geodesics), (*Gravity, Geodesics), Numerical methods and procedures, Geophysics, USSR.

Identifiers: Gravity anomalies.

Formulas for calculating normal heights, normal heights differences and theoretical closing-errors of pirit-levelling polygons have been obtained, which formulas may ensure an accuracy of the order of a millimeter in mountainous regions. Methods are proposed for computing the heights of points located in the interior of the Earth. It is shown that the Vignal's system of heights was obtained irrespectively of the problem of determining the total height of points on the physical surface of the Earth above the reference ellipsoid. Vignal's heights system is not identical with the system ofnmormal heights. In spite of the widely-spread opinion, the method of height determination proposed by Rune is not identical with that of normal heights determination. The results of computations according to Rune's formulas depend on the path of the levelling line. Some inaccuracies in articles by Bokun and Chojnicki are mentioned. (Author)

AD-634 928 **Field 8E, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ON THE SOLUTION OF N. MOISEEV'S INTEGRAL EQUATION IN THE THEORY OF THE UNREGULATED FIGURE OF GEOID.
by V. Saltykov. Jun 66, 10p TC-1052
TT-666-61649
Akademiya Nauk SSSR. Comptes Rendus (Doklady) de l'Academie des Sciences de l'U.R.S.S., v16 n8 p133-7 1937.

Descriptors: (*Integral equations, *Geodesics), Geophysics, Gravity, Earth (Planet), Configuration, Nuberical analysis, USSR.

For abstract, see T 66 16.

AD-634 929 **Field 8E**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
REVIEW OF TURKESTAN TRIANGULATIONS.
by S. Fel. May 66, 23p ACIC-TC-1021
TT-666-61648
Obzor Turkestanskikh Triangulyatsii, trans of Goedezist (USSR) n4 p22-37 1930.

Descriptors: (*Geodesics, USSR), (*Surveying, USSR), Mapping.

For abstract, see T 66 16.

AD-634 930 **Field 8E**
CFSTI Prices: HC$2.00 MF$0.50
Aeronautical and Chart Information Center, St. Louis, Mo. Linguistic Section.
APPLICATION OF FIRST APPROXIMATION FORMULAE FOR THE COMPUTATION OF CHARACTERISTICS OF THE EARTH'S GRAVATIONAL FIELD.
by L. P. Pellinen. May 66, 33p ACIC-TC-1025
TT-66-61647
Primenenie Formul Pervogo Priblezheniya dlya Vychisleniya Kharakteristik Gravitatsionnogo Polya Zemli, trans. of Tsentralnyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii. Trudy (USSR) v157 p85-100 1965.

Descriptors: (*Geodesics, *Gravity), Earth (Planet), Isostatic change, Numerical analysis, Geophysics, USSR.

Identifiers: Gravity anomalies.

The methods for numerical calculation of the earth's gravitational field characteristics are considered according to Molodensky's first approximation formulas. In the cases where the mean values of gravity anomalies and G sub 1 corrections obtained for some areas can be used, it is recommended to determine the mean values of G sub 1 omitting the determination of their point values. When the radius of the averaging area is larger than 20km it is practical to use, instead of G sub 1 much smaller and more stable G' corrections (see formula 10). When free air anomalies are used, then the mean values of these corrections are close to the mean values of terrain reduction. The method is considered for the combined calculation of the mean values of delta g and G' from the data of the correlation analysis of the gravity anomalies and the heights of the earth's physical surface. It is recommended to eliminate the constant part from the anomalies when the effect of the nearest areas on the quasigeoidal heights and plumb-line is calculated. A rough evaluation of the mean values of the G sub 2 and G sub 3 corrections is made for large areas. (Author)

AD-634 934 **Field 8E**
CFSTI Prices: HC$6.00 MF$1.25
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
STUDIES ON GEODETIC GRAVIMETRY.
by V. V. Brovar. Apr 66, 208p TC-971
TT-66-61643
Issledovaniya po Geodezicheskoi Gravimetrii, trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros"emki i Kartografii. Trudy (USSR) v157 139p 1965.

Descriptors: (*Geodesics, *Gravity), Isostatic change, Numerical methods + procedures, Geophysics, USSR.

Contents: Methods of calculation based on Molodenskiy's integral equation for the disturbing potential; Verification on a model of the principle of numerical integration for the computation of the disturbing potential, based on Molodenskiy's integral equation; Evaluation on a model of the earth of the individual terms of the correction to Stoke's approximation of the coefficients of expansion of the disturbing potential; Evaluation of the mean value of the square of inclinations in the individual sections of a mountain area; On the calculation of normal heights; Use of first-approximation formulas for the computation of the characteristics of the earth's gravitational field; Tables for the computation of the non-linearity of the influence of the heights of the topographic massif on plumb line deflections; Template used for the computation of the influence of adjacent zones upon the height of the Quasi-Geoid and the deflection of the plumb line during the evaluation of the influence of the given zones by Molodenskiy's formulas; Computation of first and second vertical derivatives of gravity from maps of its anomalies; Evaluation with the aid of terrestrial models of the precision of Numerov's formula for the vertical gradient of gravity; Comments on the short report of I. F. Monin on the computation of deflections of the plumb line.

AD-634 935 **Field 8E, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
THE NATURE OF THE NOVOTSARITSYNSKAYA GRAVITY ANOMLY IN THE LOWLANDS OF CRIMEA, ACCORDING TO THE DATA FROM THE SEISMIC TESTS.
by V. B. Sollogubov, A. V. Chekunov, N. I. Pavlenkova, and L. A. Khilinskii. Apr 66, 20p TC-999a
TT-66-61642
Priroda Novotsaritsynskoi Gravitatsionnoi Anomalii v Ravninnom Krymu po Dannym Seismicheskikh Issledovanii, trans. of Geofizicheskii Sbornik (USSR) v8 n10 p3-12 1964.

Descriptors: (*Geodesics, USSR), (*Gravity, Geodesics), (*Isostatic change, USSR), Geophysical prospecting, Seismology, Structural geology, Geophysics.

Identifiers: Gravity anomalies.

For abstract, see T 66 16.

AD-635 369 **Field 8E**
CFSTI Prices: HC$6.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
PROBLEM ON IRREGULAR 3-DIMENSIONAL DENSITY DISCONTINUITY SURFACES.
by Hsu Yun. 1966, 20p ACIC-TC-992
TT-66-61765
Pu kuei tse san wei mi tu fen chieh mien wen t'i, trans. of Ti Ch'iu Wu Li Hsueh Pao (Chinese People's Republic) v24 n1 p56-65 1965.

Descriptors: (*Geodesics, *Isostatic change), Statistical functions, Statistical analysis, Geophysics, Gravity, China.

Identifiers: Gravity anomalies.

Homogeneous isotropic multi-variable random function is used to describe the fluctuation of the 3-dimensional density discontinuity surface. A relationship between the gravity anomaly and the change of the discontinuity surface buried depth is derived on the basis of the statistical equivalent method. The result is used to analyze the relation of linear correlation between the crustal thickness and the local Bouguer gravity anomaly, and good agreement is obtained in comparison with the actual statistical data. (Author)

AD-634 933 **See Field 8G**

AD-634 936 **See Field 8G**

AD-635 285 **See Field 17F**

8F. GEOGRAPHY

AD-634 921 **Field 8F**
CFSTI Prices: HC$5.00 MF$1.00
Dept. of the Navy, Washington, D. C.
NATURAL REGIONS OF THE USSR,
by F. N. Mil'kov. 1 Mar 66, 188p I-6249
TT-66-61616
Trans. of mono. Prirodnye Zony SSSR, Moscow, 1964 286p.

Descriptors: (*Geography, USSR), Climatology, Soils, Plants (Botany), Animals, Terrain.

The purpose of this book is to describe in concise form the natural zones of the plains of the USSR. A characterization of the mountainous territories, where latitudinal zonality is complicated by the altitude distribution of landscape types by belts, did not enter into the task of work. To complete the picture, however, a special chapter, entitle 'Mountain Landscapes of the USSR,' is provided; this chapter should be regarded as an appendix of sorts to the book.

AD-634 924 **Field 8F**
CFSTI Prices: HC$3.00 MF$0.75
Department of the Army, Washington, D. C.
VLADIVOSTOK GUIDEBOOK,
by S. Nikolaev. 31 Mar 66, 68p LN-86-66
TT-66-61617
Trans. of mono. Putevoditel po Vladivostoku, 1965.

Descriptors: (*Urban areas, USSR), (*Geography, USSR), History, Economics, Culture.

Identifiers: Vladivostok.

The city's location, nature, climate, history, cultural life, sights are presented.

AD-447 402 **See Field 4B**

AD-635 210 **See Field 14B**

AD-635 370 See Field 8G

AD-635 372 See Field 8G

PB-170 266 See Field 5C

PB-170 292 See Field 5C

PB-170 299 See Field 5C

PB-170 306 See Field 5C

PB-170 313 See Field 5C

PB-170 523 See Field 8I

8G. GEOLOGY AND MINEROLOGY

AD-634 825 **Field 8G, 8J**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs. Seattle, Wash.
THE DARWIN RISE AND THE ORIGIN OF THE CONTINENTS.
by E. Orowan. Dec 65, 37p D1-82-0498

Descriptors: (*Orogeny, Theory), (*Pacific Ocean, *Ocean bottom topography), Geology.

Identifiers: Continental drift, Darwin Rise.

The Darwin Rise across the Pacific may be the remnant of a recently subsided but ancient oceanic ridge created by the upwelling of the single-cell convection which, according to Hills and Jeffreys, had swept together the primeval continent and opened up the Pacific. In a modified form this theory is immune to objections raised in the past, and it may provide a basis for understanding the cause of the Taylor-Wegener continental disruption, of the approximate equality of continental and oceanic heat flow, of polar wandering, and other phenomena. (Author)

AD-634 876 **Field 8G, 20K**
CFSTI Prices: HC$6.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash.
MECHANICAL PROPERTIES OF CRUST AND MANTLE.
by E. Orowan. Oct 65, 43p D1-82-0485
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Lithosphere, Mechanical properties), Geophysics, Mechanics, Geology.

For abstract, see T 66 16.

AD-634 901 **Field 8G, 18C, 15C**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
THE CONTAMINATION BEHAVIOR OF FALLOUT-LIKE PARTICLES EJECTED BY VOLCANO IRAZU,
by Carl F. Miller. Apr 66, 70p
Contract N228- (62479)69928
Proj. SRI-MU-5779
Task 3119A

Descriptors: (*Volcanoes, Explosions), (*Contamination, *Particles), (*Radioactive contamination, Simulation), Radioactive fallout, Structures, Roads, Passenger vehicles, Humans, Roofs, Plants (Botany), Particle size, Density, Decontamination, Nuclear explosions, Photomicrography, Photographs, Costa Rica.

Photographs of objects contaminated with particles ejected from volcano Irazu in Costa Rica are presented to indicate the nature of particle behavior in various environmental situations. The similarity between the particles ejected by the volcano and the fallout particles produced by land-surface nuclear detonations suggests that the contamination behavior of the radioactive fallout particles would be similar to that observed for the volcanic particles. The peculiarities of the particle behavior are discussed in rather general terms in the figure captions for each situation depicted. (Author)

AD-634 933 **Field 8G, 8E**
CFSTI Prices: HC$3.00 MF$0.75
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ISOSTASY.
by P. N. Kropotkin. 1964, 95p R.pt. no. TC-961
TT-66-61644
Trans. of mono Izostaziya, 1964 70p.

Descriptors: (*Isostatic change, *Structural geology), (*Gravity, Isostatic change), Lithosphere, Seismology, Geodesics, USSR.

Identifiers: Gravity anomalies.

The basic theoretical problems concerning the connections of gravity anomalies and, in particular, isostatic anomalies with the structure and development of the earth's crust are discussed in the report.

AD-634 936 **Field 8G, 8E, 8J**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
THE DEEP SEATED STRUCTURE OF THE EARTH'S CRUST IN CRIMEA AND IN THE BLACK SEA-SEA OF AZOV BASIN ACCORDING TO THE DATA OF GEOPHYSICAL EXPLORATIONS.
by T. S. Lebedev, and K. A. Bolyubakh. Apr 66, 17p TC-999b
TT-66-61641
Glubinnoe Stroenie Zemnoi Kory Kryma i Chernomoro-Azovskogo Basseina po Dannym Geofizicheskikh Issledovanii, trans. of Geofizicheskii Sbornik (USSR) v8 n10 p18-26 1964.

Descriptors: (*Geophysical prospecting, USSR), (*Geodesics, USSR), (*Structural geology, USSR), Black Sea, Gravity, Isostatic change, Geophysics, Oceanology.

Identifiers: Azov Sea.

For abstract, see T 66 16.

AD-635 158 **Field 8G**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
THE EFFECT OF A LOW VISCOSITY LAYER ON CONVECTION IN THE MANTLE.
Research rept.
by J. Weertman. May 66, 26p RR-203
Task DA-IVo14501B52A02

Descriptors: (*Convection (Heat transfer), *Lithosphere), Earth (Planet), Thermodynamics, Viscosity, Stresses, Geophysics.

If thermal convection occurs in the Earth's mantle, it may also occur within the Moon and Mars. The dimensions of these planets are comparable to the thickness of the Earth's mantle. Presumably the amount of radioactive heat generated per unit mass is similar in all three bodies. However, the surface morphology of the Earth differs markedly from that of the Moon or Mars. The explanation for the difference is based on the effect produced on convection in the mantle by the presence of a low 'viscosity' or low creep strength layer. A low viscosity layer changes the amount of 'coupling' between the outer crust and mantle convection. The theory assumes that the viscosity or creep strength is essentially zero in the low viscosity layer. The analysis is similar to that developed earlier for the calculation of stresses within the mantle. The deeper the low viscosity layer lies within the mantle, the greater is the coupling of the outer crust of the mantle convection currents. If the low creep strength layer lies close to the surface the outer crust is decoupled from the interior. According to the literature, the depth of the low velocity layer is determined by the temperature and pressure profiles within the mantle. (Author)

AD-635 370 **Field 8G, 8F**
CFSTI Prices: HC$4.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
USE GROUP VELOCITY OF RAYLEIGH AND LOVE SURFACE WAVES TO DETERMINE THE CRUSTAL THICKNESS IN CHINA.
by Sung Chung-ho, and T'an Ch'eng-yeh. 1966, 23p ACIC-TC-993
TT-66-61766
Yung jui lei ho lo fu mien po ch'un su tu ch'ueh ting wo kuo ti k'o hou tu, trans. of Ti Ch'iu Wu Li Hsueh Pao (Chinese People's Republic) v24 n1 p33-44 1965.

Descriptors: (*Structural geology, *China), (*Seismic waves, Structural geology), Stratigraphy.

Identifiers: Love wave.

For abstract, see T 66 16.

AD-635 371 **Field 8G**
CFSTI Prices: HC$4.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ON THE WEI-HO GRABEN.
by Wang Ts'un ch'eng. May 65, 31p ACIC-TC-1029
TT-66-61767
Lun Wei, Ho Ti Ch'ien, trans. of Ti Chih Hsueh Pao (Chinese People's Republic) v45 n2 p153-64 1965.

Descriptors: (*Structural geology, China), Faults (Geology), Geography.

The Wei-ho Graben refers to the alluvial plain on Wei-ho between Ch'in-ling and the Wei-ho Northern Hills. It begins from Pao-chi in the west and extends to T'ung-kuan in the east, a distance of about 300 kilometers. It is broad in the east and narrow in the west, forming a bugle shape, which is closed in the vicinity of Pao-chi. The widest part in the east reaches 80 kilometers.

AD-635 372 **Field 8G, 8F**
CFSTI Prices: HC$6.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ABYSSAL STRUCTURE OF THE EARTH'S CRUST ACCORDING TO SEISMIC DATA UNDER THE BLACK SEA TOWARDS THE SOUTHWEST OF CRIMEA.
by Yu. P. Neprochnov. Jun 66, 10p ACIC-TC-1042
TT-66-61768
Glubinnoe Stroenie Zemnoi Kory Pod Chernym Morem k Yugo-Zapadu ot Kryma po Seismicheskim Daynnym, trans of Akademiya Nauk SSSR. Doklady, v125 n5 p1119-22 1959.

Descriptors: (*Structural geology, *USSR), (*Seismic waves, Structural geology), Marine geology, Black Sea.

For abstract, see T 66 16.

PB-169 800 **Field 8G**
CFSTI Prices: HC$6.60 MF$0.75
Texas Technological Coll., Lubbock. Dept. of Geosciences.
THE GEOLOGY OF THE CENTRAL QUEEN MAUD RANGE, TRANSANTARCTIC MOUNTAINS, ANTARCTICA.
Research rept. series,
by F. Alton Wade, V. L. Yeats, J. R. Everett, D. W. Greenlee, and K. E. LaPrade. Sep 65, 62p
Antarctic Series-65-1
Grants NSF-G-23806, NSF-GA-122

Descriptors: (*Geology, Mountains), (*Mountains, Geology), (*Antarctic regions,

Geology), Glaciers, Stratigraphy, Structural geology, Geologic age determination.

The portion of the Queen Maud Range located roughly between the Beardmore and Massam Glaciers was surveyed geologically by field parties during the austral summers 1962-63 and 1964-65. The baseme.it complex of late-Precambrian-early-Paleozoic ages is composed of two sequences of metasediments and syntectonic and post-tectonic intrusions of granodiorite, adamellite and granite. An erosion surface levels the mountainous terrain which was developed during the Ross orogeny. On this erosion surface was deposited the Beacon Sequence of terrestrial and near-shore sediments with a total thickness in excess of 1400 m. The sequence has been subdivided into five formations: Butters, Mackeller, Buckley Coal Measures, Falla and Dominion Coal Measures. The first four are late-Paleozoic in age and the last Triassic. During the mid-Jurassic time diabase was intruded in great quantities in sheets and dikes into the Beacon rocks and to a lesser extent into the basement complex. The sheets interbedded with the Beacon sediments nearly double the thickness of the sediments alone. Also in mid-Jurassic time extrussive igneous activity resulted in the deposition of several vesicular and amygdaloidal basalt flows in the southern portion of the area. Mid-Cenozoic block faulting produced the Queen Maud Mountains. It is believed that the blocks were uplifted along a northern escarpment or series of escarpments and tilted gently towards the south where the dip slopes disappear beneath the ice of the polar plateau. The thickness of the ice sheet was greater by at least 300 m. and all but the highest peaks were overridden during maximum glacierization. The present geomorphic forms are the result of modification of the features developed by overriding ice sheets by valley glaciers. Radiometric ages place the time of the Ross orogeny as Ordovician-Silurian and the time of intrussion of diabase sheets and dikes and extrusion of basalts as mid-Jurassic. (Author)

PB-169 918 **Field 8G, 13B**
CFSTI Prices: HC$6.00 MF$1.50
Oklahoma State Dept. of Highways. Research and Development Div.
ENGINEERING CLASSIFICATION OF GEOLOGICAL MATERIALS AND (RELATED SOILS) DIVISION ONE.
by B. C. Hartronft, I. E. Barber, and L. D. Buie.1965, 270p Rept. no. 0027
Proj. 61-01-1
Availability: Original document in color until exhausted. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Engineering geology, Oklahoma), Classification, Soils, Roads, Civil engineering, Materials.

This is the first report, in preliminary draft form, of a series of State reports for the geographic highway divisions which will provide an engineering classification system of geologic materials and related soils specifically designed and devoted to highway purposes. Geologic materials have been grouped into geologic units rather than by the normal categories of age, formation and member. Each unit is representative of a specific area within a county. The various geologic materials found in the unit with the engineering characteristics are described. Features, identified with the geologic units, such as thickness, susceptibility to landslides or backslope failures, the apparent material suitability, seepage and rippability are presented in tabular form. This information is based on field observations and construction experience. The soils, classified pedologically, associated with the geologic materials are described, their geomorphic positions are illustrated and the soil engineering characteristics are tabulated. The report contains numerous figures showing idealized cross sections of the geologic units occurring in Division One. The tabulations, 'Highway Engineering Characteristics of Geologic Units' and 'Highway Engineering Characteristics of Soil Series' have been included on a sample basis, for review purposes only. These tabulations contain data on the Oklahoma Subgrade Index, AASHO classification, sieve analysis, soil constants, potential vertical rise, suitability for asphalt and cement stabilization with estimated required percentages and ratings of the suitability of the geologic units and soil series for subgrade purposes. (Author)

PB-169 919 **Field 8G, 13B, 13C**
CFSTI Prices: HC$4.00 MF$1.00
Kansas State Highway Commission.
MATERIALS INVENTORY OF SUMNER COUNTY, KANSAS.
by Gerald Hargadine, and Dale R. Johnson. 1964, 141p Materials Inventory Rept. no. 4, 0042
Availability: Original document in color until exhausted. Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Engineering geology, Kansas), Soils, Materials, Roads, Civil engineering.

This is the first of a series of State-wide county reports that will present information concerning the availability, location and nature of deposits of materials for use in highway construction and to provide a guide for materials prospecting in the county. The report gives a detailed discussion of the four phases employed in carrying out the materials investigation. Essentially these phases were: (1) research and review of available information, (2) photo interpretation, (3) field reconnaissance, and (4) correlation of data, map compilation and report writing. The report contains a geologic history of Sumner County, with descriptions of the various stratigraphic units. Emphasis is given, in the descriptions of the units, to those members that are present and possible construction material sources. A section of the report entitled 'Geo-Engineering' contains subsections entitled Materials Usage Considerations, Pollution of Water Resources and Possible Hydrology Problems in Road Construction. The report contains 6 fold-out pages of colored maps on which are delineated the various significant geologic formations. In addition, the maps contain plotted locations of the materials sites that were investigated. These sites have been given a coded site number so as to provide information concerning material type, estimated quantity, geologic unit and data sheet reference where additional detailed information can be found. The report also contains a four-part appendix consisting of 85 material survey report forms which give information on presently producing material sites and potential sites. Information is given as to the coded site numbers, general location and ownership of the site, geologic correlation data and a detailed sketch of the site drawn to a scale of 1 inch equals 1/4 mile. (Author)

PB-169 920 **Field 8G, 13B**
CFSTI Prices: HC$3.00 MF$0.50
Purdue Univ., Layfayette, Ind. Engineering Experiment Station.
AIRPHOTO INTERPRETATION OF ENGINEERING SOILS OF INTERSTATE HIGHWAY ROUTE 1-65 IN TIPPECANOE, CLINTON AND BOONE COUNTIES, INDIANA.
by P. T. Yeh, and S. J. G. Bird. 28 Oct 64, 53p Rept. no. 0025, 28
Proj. C-36-51E
Prepared in cooperation with Indiana State Highway Commission, Bureau of Public Roads, Washington, D. C. and Soil Conservation Service, Dept. of Agriculture, Washington, D. C.

Descriptors: (*Engineering geology, Indiana), Soils, Roads, Civil engineering, Photointerpretation, Aerial photographs.

The purpose of this report is to provide an engineering soils strip map along a proposed Interstate route, that can be used for planning a detailed soil survey, for materials location, to predict construction problems and for other uses relating to highway construction. This is part of an overall program for preparing engineering soil maps on a county basis. This report contains engineering soil maps prepared by airphoto interpretation methods on a photo mosaic base at an approximate scale of one inch representing 1500 feet (1/18,000). The mapped soil areas are generally designated by land forms such as sand dunes, ridge moraines and terraces. No field checks or soil explorations were made of the mapped areas. The report contains a description of the physiography, topography and geology of the area as well as generalized profiles of the soil areas outlined on the map. In addition, the report contains a description of the various land forms and engineering soil areas encountered along the alignment. (Author)

AD-634 935 **See Field 8E**

AD-634 979 **See Field 8K**

AD-635 063 **See Field 8J**

AD-635 076 **See Field 8J**

CEX-59.4.23 **See Field 18H**

PB-169 876 **See Field 4B**

PB-170 299 **See Field 5C**

8H. HYDROLOGY AND LIMNOLOGY

PB-170 638 **Field 8H, 13B**
CFSTI:MF/$0.75
Bureau of Reclamation, Denver, Colo.
GROUND-WATER MOVEMENT.
Water resources tech. pub.,
by R. E. Glover. 1966, 80p Engineering Monograph-31
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, ot the Chief Engineer, Bureau of Reclamation, Attention 841, Denver Federal Center, Colo., 80225, $0.50.

Descriptors: (*Hydrology, Underground), (*Water supplies, Hydrology), Natural resources, Water wells, Water, Fluid flow, Civil engineering.

Identifiers: Ground water.

This monograph presents analyses of a variety of ground-water problems encountered in the planning and development of Bureau of Reclamation water resources projects in the western United States. These problems include analysis of depletions caused by pumping, estimates of seepages, computation of return flows, analysis of drawdown, and estimates of permeabilities for selection of pump capacities. In analyzing these and other ground-water problems, theoretical assumptions and limitations are outlined and specific problems are computed through the use of charts, tables, and the solution of equations derived from the theoretical considerations.

AGN-8135 **See Field 18B**

PB-169 522 **See Field 13B**

8I. MINING ENGINEERING

PB-170 523 **Field 8I, 8F, 5C**
CFSTI Prices: HC$4.00 MF$0.75
Minnesota Univ., Minneapolis. Mines Experiment Station.
PROGRESS REPORT NO. 11.
1 Jul 65, 115p

Descriptors: (*Mining engineering, Minnesota), (*Minnesota, Mining engineering), Ores (Metal sources), Iron, Separation, Magnetism, Magnetic materials, Gravity, Flotation, Silicon compounds, Dioxides, Magnetite, Magnetic fields, Pellets, Starches, Soaps, Calcium, Economics.

Identifiers: Silicon dioxide.

CONTENTS: Factors of dry magnetic concentration on the Sala-Mortsell Separator, by J. H. Vollmer; Amenability of Mesabi gravity concentrates to upgrading, I. Preliminary bench scale flotation and electrodynamic tests, by R. R. Beebe; Optimization of a flotation circuit by statistical methods, by R. M. Hays; Carpco wet magnetic scalper, by J. H. Vollmer; Carpco high intensity wet magnetic separator, by J. H. Vollmer; Decrepitation of balls during pelletization of iron ores, by N. F. Schultz; Factors of wet magnetic drum separation, Part II, by J. H. Vollmer; Interaction of starch and calcium in soap flotation of activated silica from iron ores, by I. Iwasaki.

8J. PHYSICAL OCEANOGRAPHY

AD-634 878 **Field 8J**
CFSTI Prices: HC$3.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash.
THE AGE OF THE OCEAN FLOOR.
by E. Orowan. Apr 66, 14p D1-82-0521
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Ocean bottom topography, *Geologic agedetermination), Marine geology, Ocean bottom, Orogeny, Paleontology, Sedimentation.

An analysis of the divergent flow at convective upwellings along oceanic ridges shows that sediments of any age may occur at any distance from the axis of the ridge. The Lower Miocene microfossils recently reported by Saito, Ewing, and Burckle near the axis of the Mid-Atlantic Ridge, therefore, do not indicate any slowing down or cessation of crustal flow or of continental drifting. (Author)

AD-635 063 **Field 8J, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Naval Oceanographic Office, Washington, D. C.
THE THICKNESS OF THE SEDIMENT LAYER AND THE STRUCTURE OF THE EARTH'S CRUST IN SEAS AND OCEANS ACCORDING TO THE RESULTS OF SEISMOACOUSTIC INVESTIGATIONS.
by G. B. Udintsev, Yu. P. Neprochnov, and V. M. Kovylin. 1966, 14p Trans-301
TT-66-61655
Moshchnost Osadochnogo Pokrova i Stroenie Zemnoi Kory v Moryakh i Okeanakh po Rezultatam Seismoakusticheskikh Issledovanii, trans. of Okeanologicheskie Issledovaniya (USSR) n13 p181-8 1965.

Descriptors: (*Geophysical prospecting, *Ocean bottom topography), (*Structural geology, Ocean bottom), Marine geophysics, Seismology, Acoustics, Pacific Ocean, Indian Ocean, Japan Sea, Black Sea, Mediterranean Sea, USSR.

During the IGY period the Institute of Oceanology of the USSR Academy of Sciences carried out seismo-acoustic measurements in the seas and oceans. These measurements were done by the seismic reflection and refraction methods in the Pacific and Indian oceans as well as in the Black, Japanese and Mediterranean seas. New data were obtained on the structure of the Earth's crust and sediments. Much similarity has been found between the Earth's crust structure under the bottom of the Pacific and Indian oceans and that of the enclosed and continental seas. The absence of the granite layer is common to all the above mentioned basins which differ from each other by the thickness of the sedimentary layer. (Author)

AD-635 076 **Field 8J, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Dept. of the Navy, Washington, D. C.
STATE AND PROBLEMS OF WORLD OCEAN GEOLOGY.
by A. P. Lisitsyn, and G. B. Udinstev. Jul 63, 14p Trans-1091
TT-66-61658
Trans. of Akademiya Nauk SSR. Vestnik n7 p21-32 1963.

Descriptors: (*Marine geology, State-of-the-art reviews), Oceanology, Instrumentation, USSR.

For abstract, see T 66 16.

AD-635 120 **Field 8J, 20M**
CFSTI Prices: HC$1.50 MF$0.50
Naval Ordnance Lab., White Oak, Md.
SPECIFIC VOLUME, THERMAL EXPANSION, AND ISOTHERMAL COMPRESSIBILITY OF SEA WATER.
by Wayne Wilson, and David Bradley. 2 Jun 66, 52p NOLTR-66-103
Task RU-22-20-000/R104-03-01

Descriptors: (*Sea water, Thermodynamics), Thermal properties, Experimental data, Tables.

The specific volume has been measured for distilled water and for five samples of sea water near salinities of 10, 20, 30, 35, and 40%. These measurements were obtained for temperatures between 0 C and 40 C, and for pressures up to 14,000 psi. The Tumlirz equation of state has been fitted to the experimental data by the method of least squares. This equation was then used to compute tables for the specific volume, the thermal expansion, and the isothermal compressibility over the full range of variables considered. This data is compared with that obtained from the works of other authors.

AD-635 259 **Field 8J**
CFSTI Price: MF$0.50
Naval Oceanographic Office, Washington, D. C. Oceanographic Prediction Div.
QUANTITATIVE ANALYSIS OF SOME BATHYTHERMOGRAPH ERRORS.
Technical rept.
by John B. Hazelworth. Jan 66, 30p
Proj. HS-032
NOO-TR-180, ASWEPS-11

Descriptors: (*Bathythermograph data, Errors), Bathythermographs, Calibration, Oceanology.

A statistical study of errors associated with the bathythermograph (BT) has been made from data obtained during eight 3-week cruises to ocean weather stations (OWS) DELTA and ECHO. Simultaneous observations using reversing thermometers, bucket thermometers, and injection thermometers and nine sets of observations using two connected BT's were analyzed. BT instrument bias varies with depth as much as 1F with maximum error occurring in the thermocline. One pair of BT's recorded standard errors that varied from 0.20 to 0.6 (F) with depth and averaged 0.34 (F). Mean differences between reversing thermometer reference temperatures and BT, bucket, and injection thermometer temperatures were computed. Comparison of these differences indicate that ship injection thermometers averaged 1 (F) high; the BT's and bucket thermometers recorded sea surface temperature with approximately the same degree of accuracy, averaging within 0.5F of the reference temperature. At present, BT observations are processed by the National Oceanographic Data Center without correcting for instrument bias. Comparisons between uncorrected data and data containing a temperature correction factor (TCS) based on bucket thermometer readings indicate that the correction factor increases the average accuracy of the observation; however, the increase in accuracy is small. Accuracy of several examples was decreased by correction. (Author)

PB-169 877 **Field 8J**
CFSTI Prices: HC$31.80 MF$1.50
Lamont Geological Observatory, Palisades, N.Y.
PHYSICAL AND CHEMICAL OCEANOGRAPHIC OBSERVATIONS IN THE SOUTHERN OCEANS) U S N S ELTANIN CRUISES 7-15, 1963-1964,
by Stanley S. Jacobs. Dec 65, 317p Technical rept. TR-1, CU-1-65
Grant NSF-GA-194

Descriptors: (*Oceanographic data, Antarctic regions), Hydrographic surveying, Chemical properties.

Identifiers: Eltanin cruises, Southern Ocean.

For abstract, see T 66 16.

PB-170 518 **Field 8J**
CFSTI Prices: HC$4.60 MF$0.50
Pacific Oceanographic Lab., Seattle, Wash. Physical and Chemical Branch.
TEMPERATURE SECTIONS WITH SURFACE SALINITY AND SIGMA-T VALUES FOR THE NORTHEAST PACIFIC OCEAN, 1961 THROUGH 1965.
Manuscript series,
by Ronald K. Reed. Jan 66, 43p Rept. no. 1
Prepared in cooperation with Department of Commerce, Washington, D. C.

Descriptors: (*Bathythermograph data, Pacific Ocean), (*Pacific Ocean, Bathythermograph data), Temperature, Salinity, Hydrographic surveying, Oceanographic data, Maps.

Twenty-nine temperature sections drawn from bathythermograph observations by Coast and Geodetic Survey (C and GS) ships along selected tracks in the Northeast Pacific, 1961 through 1965, are presented. Surface salinity and sigma-t values are shown for 15 of the tracks. (Author)

AD-634 825 **See Field 8G**

AD-634 936 **See Field 8G**

AD-635 521 **See Field 13J**

8K. SEISMOLOGY

AD-634 914 **Field 8K**
CFSTI Prices: HC$1.00 MF$0.50
Uppsala Univ. (Sweden). Seismological Inst.
SEISMIC WAVE PROPAGATION IN LAYERED MEDIA. PART I,
by Enders A. Robinson. 15 Apr 66, 14p
Scientific-37
Contract AF 61 (052)-702
AFCRL-66-435

Descriptors: (*Seismic waves, Propagation), Seismology, Structural geology, Mathematical models, Earth models.

For abstract, see T 66 16.

AD-634 979 **Field 8K, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash.
DILATANCY AND THE SEISMIC FOCAL MECHANISM,
by E. Orowan. Jan 66, 24p D1-82-0504
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: (*Seismology, *Structural geology), Rock (Geology), Deformation, Propagation, Soil mechanics, Geophysics.

In a recent paper (Reviews of Geophysics 3:1965) F. C. Frank suggested that the seismic focal stress drop might be the consequence of a mechanical instability of deformation due to dilatancy of the crust and mantle. A more complete calculation shows that the instability attributed to dilatancy is a familiar general property of compacted granular masses independent of dilatancy. The rapid propagation of the seismic fault attributed to shear

melting by elastic energy release would depend on the assumed absence of friction between the walls of an initial Griffith crack. Since the length of the thin Griffith crack was estimated at 5 km, friction could be absent only if the crack were filled with a pore fluid of pressure equal to the total pressure; in this case the shear strength would be zero and seismic shocks could not arise. (Author)

BNWL-241 **Field 8K, 18D, 20E**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
LASER INTERFEROMETER STRAIN SEISMOGRAPH DESCRIPTION AND DISCUSSION OF THE FEASIBILITY DEMONSTRATION EXPERIMENT.
by B. B. Brenden, and R. B. Jacob. May 66, 14p
Contract AT (45-1)-1830

Descriptors: (*Lasers, Interferometers), (*Seismographs, Strain (Mechanics)).

For abstract, see N 20 14.

PNE-504F See Field 18C

PNE-913F See Field 18C

8M. SOIL MECHANICS

AD-635 233 **Field 8M**
CFSTI Prices: HC$3.00 MF$0.75
Arizona State Univ., Tempe.
AN INVESTIGATION OF THIXOTROPY IN HIGHLY PLASTIC CLAYS.
Master's thesis.
by Morris Dee Swensen. May 66, 94p

Descriptors: (*Soil mechanics, *Clay), Hardening, Colloids, Rheology, Plasticity, Soils, Shear stresses.

This study was made to establish the effect of thixotropy on a specified clay and to determine if a means could be established where thixotropy can be predicted and then used in design. A review was made of the theories of thixotropy and how the strength increases takes place. Investigations performed by other authors were reviewed and their conclusions on the feasibility of using thixotropic strength increase in design was discussed. Two clays were used in the study. Each was prepared at three different water contents near the liquid limit. The samples were placed in two types of containers and stored under water. Shear strength is affected by changes in water content; therefore a secondary study was to determine the effectiveness of the methods used to control the water content of the stored samples. Samples were stored a maximum of 150 days. Tests were made at specified times during this period to determine the strength increase that developed with time. It was found that the strength increase of the clays tested could be defined by an equation. The accuracy of the equation was not determined for all water contents but only those used in the study. (Author)

PB-169 499 See Field 13B

8N. TERRESTRIAL MAGNETISM

AD-635 134 **Field 8N, 4A**
CFSTI Prices: HC$2.00 MF$0.50
Directorate of Scientific Information Services, Ottawa (Ontario).
EXPLORATION OF THE TERRESTRIAL MAGNETOSPHERE IN THE REGION OF THE RADIATION BELT (3-6 Re), FEBRUARY TO APRIL 1964. EXPLORATION BY ELEKTRON SATELLITES OF TERRESTRIAL MAGNETOSPHERE AT DISTANCE 7-11.7 EARTH RADII.
by Sh. Sh. Dolginov, E. G. Eroshenko, and L. N. Zhuzgov. May 66, 33p T-455-R
TT-66-61660
Trans. of mono. Issledovaniya Kosmicheskogo Prostranstva, Moscow 1965 p342-67.

Descriptors: (*Terrestrial magnetism, *Upper atmosphere), (*Atmospheric sounding, Terrestrial magnetism), Scientific satellites, Magnetometers, Magnetic fields, Space environmental conditions, USSR.

For abstract, see T 66 16.

AD-634 841 See Field 4A

9A. COMPONENTS

AD-296 534 **Field 9A, 11A**
CFSTI Price: HC$3.60
Radio Corp. of America, Lancaster, Pa. Power Tube Operations.
DIELECTRIC TO METAL SEAL TECHNOLOGY STUDY.
Quarterly rept. no. 1, 19 Mar-30 Jun 62.
by M. Berg, A. C. Grimm, and F. F. Marinaro.Jul 62, 33p
Contract AF 30 (602)-2682
Proj. AF-5573
Task 557303
RADC-TDR-62-401

Descriptors: (*Dielectrics, Metal seals), (*Metal seals, Dielectrics), Microwave equipment, Adhesives, Refractory metals, Manufacturing methods.

A theoretical and experimental investigation leading to the development of improved dielectric-to-metal seals and sealing techniques for use with output windows for high-power microwave tubes was conducted. Investigation of refractory metal and active metal processes were initiated. The refractory metal processes are being used for synthetic sapphire and beryllium oxide. The active metal processes are being used for fused silica and pyroceram. A comprehensive literature survey was compiled and is included as Appendix A. Various dielectric materials were evaluated for electrical loss and mechanical strength and the optimum materials were selected. Work on compression-band seals was given priority over the metalized sealing techniques because no metalizing is employed in the seal. Other advantages of the compression-band seal are a minimum of radio frequency loss and its adaptability to different dielectric materials. Several experimental seals were fabricated to learn the factors necessary to produce a practical seal. Although the seals failed, valuable information was accumulated.

AD-434 100 **Field 9A, 9C**
CFSTI Price: HC$4.60
Radio Corp. of America, Princeton, N. J. Defense Electronic Products.
FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM TRIODES.
Quarterly rept. no. 2, 1 Oct-31 Dec 63.
30 Jan 64, 47p
Contract DA-36-039-AMC-02374

Descriptors: (*Triodes, Thin films (Storage devices)), (*Space charges, Reliability (Electronics)), Transistors, Field emission, Life expectancy, Failure (Mechanics), Stability, Microminiaturization (Electronics), Field theory, Cadmium compounds, Sulfides, Semiconducting films.

This work was performed on thin-film transistors of the field effect type, both from a device viewpoint and from a materials aspect. Emphasis has been placed on an intensive study of the shelf and operating lives of Cds thinfilm transistors, with a view toward isolating and identifying the failure mechanisms and the technological factors contributing to the failure.

AD-458 145 **Field 9A, 9C**
CFSTI Price: HC$6.60
Radio Corp. of America, Harrison, N. J. Electronic Components and Devices.
A 10-MW, X-BAND TUNNEL-DIODE OSCILLATOR.
Final rept., 1 Jul 63-31 Aug 64.
31 Aug 64, 70p
Contract DA-36-039-AMC-03195 (E)
Proj. DA-3A99-21-002

Descriptors: (*Tunnel diodes, Microwave oscillators), (*Microwave oscillators, Tunnel diodes), X-band, Manufacturing methods, Electrical engineering.

Tunnel-diode oscillators were developed for X-Band. Each oscillator contained a single diode in a low inductance package, and delivered between 2 and 2 and 1/2 milliwatts of rf power. Three and one half milliwatts were obtained in initial experiments with two oscillators operating in parallel. It appears that power outputs up to 5 mw are possible with this technique. Diode technology was improved to the point where speed ratios (I sub P/C) of up to 100:1 were obtained with corresponding cutoff frequencies up to 30 Gc. A theoretical analysis was developed which allows one to determine the power that may be expected from a tunnel-diode with given characteristics. The validity of the theory was established by comparison with experimental results. (Author)

AD-634 826 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR A GERMANIUM PNP POWER TRANSISTOR.
Quarterly progress rept. no. 3, 15 Oct 65-14 Jan 66,
by Dan Sullivan, and Paul Greer. 14 Jan 66, 44p U-18
Contract DA-36-039-AMC-06161 (E)
Proj. DA-26099
See also AD-629 893.

Descriptors: (*Transistors, Germanium), (*Germanium, Transistors), Manufacturing methods, Reliability (Electronics), Performance (Engineering), Crystals, Specifications.

A summary of the various investigations performed during the engineering phase of this contract and a discussion of preparations being made for the production phase is presented. Reliability test data and the results of SP1882H evaluation studies have also been reported. (Author)

AD-634 828 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR INSULATED GATE FIELD EFFECT TRANSISTORS.
Quarterly progress rept. no. 1, 30 Nov 65-28 Feb 66,
by James George, and Dale Reinke. 28 Feb 66, 63p M-18
Contract DA-36-039-AMC-06174 (E)
Proj. DA-24001

Descriptors: (*Transistors, Manufacturing methods), Reliability (Electronics), Transistor amplifiers, Very high frequency, Noise (Radio), Gain, Failure (Electronics), Oxides, Stability, Semiconductors, Silicon.

Identifiers: Field-effect transistors, Metal oxide semiconductors.

A complete basic design is presented for the high frequency Insulated Gate Field Effect Transistor. MOS stability is examined and a general filure mode discussion is presented. It is found that most noncatastrophic failures result from the movement of charged ionic species in the gate oxide. In order to minimize this instability different stabilizing techniques are reported with emphasis on those applicable to the MOS production area. The effect of various etches, solvents, and rinses on device stability and performance are listed, and results

are presented on the difference in processing sequences such as hot evaporation and cold evaporation, with and without a phosphorus-stabilized system. The production sequence for the RF MOSFET is listed as well as progress in improved packaging techniques. Final probing and testing capabilities for the RF MOS device are outlined. (Author)

AD-634 861 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Sylvania Electric Products, Inc., Woburn, Mass. Semiconductor Div.
PRODUCTION ENGINEERING MEASURE (PEM) FOR SILICON VARIACTOR DIODE.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 66, by G. Bowne, and R. Bayliss. 31 Mar 66, 56p
Contract DA-36-039-AMC-06159 (E)
See also AD-630 196.

Descriptors: (*Varactor diodes, *Manufacturing methods), (*Silicon, Varactor diodes), Diodes (Semiconductor), Failure (Electronics), Semiconductor devices.

Screening and testing has been completed on units from the third engineering test sample run. The results show a significant reduction in failure rates over those for units from the first two engineering test sample runs. Preliminary test data indicates that work performed during the fourth quarter has resulted in improvement of the cutoff frequency characteristics. (Author)

AD-634 862 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Sylvania Electric Products, Inc., Woburn, Mass. Semiconductor Div.
PRODUCTION ENGINEERING MEASURE (PEM) FOR SILICON MIXER DIODE.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 66, by G. Bowne, R. Bayliss, and C. Brunquell. 31 Mar 66, 64p
Contract DA-36-039-AMC-06159 (E)
See also AD-630 195.

Descriptors: (*Silicon, Diodes (Semiconductors)), (*Crystal mixers, Diodes (Semiconductors)), (*Diodes (Semiconductor), *Manufacturing methods), Mixers (Electronic).

The third engineering test sample run has been completed using the new package design, thermocompression bonding of two silicon lots and tungsten whiskers with varying wire and point characteristics. Preliminary screening of these units indicate that units with tungsten wire of increased tensile strength can better withstand mechanical and thermal stresses. Step stress analysis of storage life test data on units from the second run show a failure rate of 0.1% per 1000 hours compared to the objective 0.001% level. (Author)

AD-634 975 **Field 9A, 13H, 14B**
CFSTI Prices: HC$1.00 MF$0.50
CTS Corp., Elkhart, Ind. Research and Development Div.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS.
Quarterly progress rept. no. 19, 1 Jan-31 Mar 66. by C. L. Holmes, and D. C. Kinsey. 31 Mar 66, 13p
Contract DA-36-039-sc-85976E
See also AD-627 413.

Descriptors: (*Potentiometers, Manufacturing methods), (*Subminiature electronic equipment, Potentiometers), Transistors, Performance (Engineering), Life expectance, Resistance (Electrical).

The 300 controls tested in accordance with Action II,Technical Action Request No. 8, completed the testing required during this reporting period. All controls tested on the moisture resistance specification passed all requirements satisfactorily. The 100 controls of the 25,000 ohm bushing mount style which were tested on the 25,000 cycle rotational life test had a few controls which exceeded the allowable plus or minus 3% change in resistance with a maximum change of 6.58%. (Author)

AD-635 006 **Field 9A, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A FERRITE-TRIODE PRINTED CIRCUIT CARD, CONTROLLED BY A TRIGGER.
by N. A. Yarmosh. 11 Feb 66, 14p FTD-MT-65-200
TT-66-61652
Edited machine trans. of mono. Akademiya Nauk BSSR. Ferrity i Beskontaktnye Elementy, Minsk, 1963 p390-8.

Descriptors: (*Computer logic, *Trigger circuits), USSR, Ferromagnetic materials, Transistors, Transformers, Printed circuits, Coupling circuits, Switching circuits.

The paper describes a logical circuit of a ferrite-triode card controllable by a trigger which may be used as a basic element in an electronic computer.

AD-635 093 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
IMPROVEMENT OF MILITARY RF CONNECTOR DESIGNS FOR INCREASED RELIABILITY.
Technical rept.
by William E. Mayo. May 66, 31p ECOM-2705
Task DA-1P6-22001-A057-04

Descriptors: (*Electric connectors, Radiofrequency cables), Reliability (Electronics), Design, Military requirements, Standing wave ratios, Microwave equipments, Performance (Engineering).

The report contains a review of design features used for RF connectors in general. It includes a discussion of the problem areas found in present military designs with new design considerations suggested for connection and improvement. It includes the presentation of new designs and the fabrication of prototype models featuring a new connector cable clamp and an improved mating design to increase performance and reliability of present and future designs due to upgraded microwave frequency application. The report covers the investigation of the prototype designs compared with standard conventional designs. (Author)

AD-635 094 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
AERIAL INSTALLATION OF CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-4245 ()/G.
Technical rept.,
by Morton Pomerantz, and Frank Rogers. May 66, 24p ECOM-2711
Task DA-1E640306D48706

Descriptors: (*Coaxial cables, Installation), Cable grips, Transmission lines, Configuration, Supports, Suspension devices.

The report contains the results of an investigation leading to the establishment of procedures for the aerial installation of Cable Assembly, Special Purpose, Electrical CS-4245 ( )/G. Background information for this investigation, details of the testing program, installation procedures with associated hardware, and recommended Sag Tables are included. (Author)

AD-635 118 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY TRANSISTORS.
Quarterly progress rept. no. 5, 1 Jan-31 Mar 66. by Michael Cassidy, and Paul Greer. 31 Mar 66, 45p
Contract DA-36-039-AMC-06156 (E)
Proj. DA-74001
See also AD-628 230.

Descriptors: (*Transistors, Manufacturing methods), (*Silicon, Transistors), Disks, Reliability (Electronics), Failure (Electronics), Storage, Diffusion, Ultrasonic welding, Bonding, Specifications.

The following process steps are described: scribing, die breaking, die bonding, wire bonding, deionized water boil and bake, cascade rinse, bake, and weld. The efforts expended by the Reliability Program Department were in the areas of test performance, electrical parameter measurements, data analysis, and preparation of the 2N2369 specification and Quality Control Plan. (Author)

AD-635 128 **Field 9A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Weston Instruments, Inc., Archbald, Pa.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 DATED 9 FEBRUARY, 1962 AND MIL-R-22097B (MODIFIED).
Quarterly progress rept. no. 12, 1 Apr-30 Jun 65. 30 Jun 65, 18p
Contract DA-36-039-sc-86734 (E)
See also AD-621 891.

Descriptors: (*Variable resistors, Manufacturing methods), Metal films, Resistance (Electrical), Wear resistance, Heat treatment, Electric terminals, Chemical analysis, Potentiometers.

Identifiers: Trimmer resistors.

Analytical methods were developed for all but one ingredient in the bath from which the film is deposited. Analytical procedures for evaluation of the deposited film were developed and are ready for use during subsequent work requiring analysis of the effects of film application variables. A piece of equipment was designed and made for analysis of wear characteristics of the film. Some study of the wear resistance was performed. Baths were run with newly available controls and an improved consistency of results obtained. Because methods for analyzing all ingredients of the bath are not yet available, it has not been possible to have complete control over the deposition of the film. Baths have been run omitting the ingredients for which the analytical methods were not available. These baths proved to be impractical for production usage. Fundamental studies were made on the heat treating of the film. Various methods of terminating were evaluated and the method previously in use remains the best. Further studies of film variation as a result of the method of termination indicates that the variations previously suspected could not in fact be attributed to the method of termination. (Author)

AD-635 129 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Weston Instruments, Inc., Archbald, Pa.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 AND MIL-R-22097B (MODIFIED).
Quarterly progress rept. no. 13, 1 Jul-30 Sep 65. 30 Sep 65, 37p
Contract DA-36-039-sc-86734 (E)
See also AD-635 129.

Descriptors: (*Variable resistor, Manufacturing methods), Metal films, Resistance (Electrical), Chemical analysis, Wear resistance, Heat treatment, Potentiometers, O-rings, Environment tests.

Identifiers: Trimmer resistors.

Methods for chemical analysis of all ingredients in the metallizing bath were developed and are being incorporated in the control procedure. The experimental effort for the bath variable study was completed with the exception of wear testing. The data has not been completely evaluated, however, useful information has been obtained. Certain additional work based on the partial results is already in progress. A number of heat treatments were tried to improve wear resistance. The results were encouraging but the ability to predictably reproduce satisfactory wear resistance has not been attained. A study was initiated on the effects of heat treatment and film wear on high temperature exposure tests. Sample 'O' rings were received and evaluated as a means of improving the seal on the potentiometer. Results to date are promising but further work is needed. (Author)

AD-635 136 **Field 9A, 20B**
CFSTI Prices: HC$3.00 MF$0.75
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
RESEARCH FOR DEVELOPMENT OF EPITAXIAL TECHNIQUES FOR USE IN FABRICATION OF SILICON CARBIDE DEVICES.
Final scientific rept., 1 Feb 65-31 Jan 66.
by Don Jackson. 13 May 66, 64p
Contract AF 19 (628)-4802
Proj. AF-4608
Task 460805
AFCRL-66-400

Descriptors: (*Semiconducting films, Epitaxial growth), (*Silicon compounds, Carbides), Diodes (Semiconductor), Transistors, Substrates, Doping, Band theory of solids, Semiconductor devices, Chlorides, Silanes, Propanes, Microstructure.

Identifiers: Silicon carbide, Field-effect transistors.

Attempts were made to fabricate p-n junction diodes and SiC channel isolated-gate field-effect transistors. P-type doping was not possible and, consequently, the p-n junction work was terminated without success. Attempts to make n-channel, SiC IGFET's on silicon substrates were not successful, nor were attempts to fabricate the same structures on sapphire substrates. Silicon IGFET structures with acceptable device quality parameters were grown using identical techniques, demonstrating the feasibility of the approach. No acceptable SiC device characteristics were demonstrated during this contract. This could be attributed to poor structure quality, or the presence of an anomaly such as impurity bands which would inhibit device action. (Author)

AD-635 183 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Philco Corp., Lansdale, Pa.
LOW COST INTEGRATED CIRCUIT TECHNIQUES.
Progress rept. no. 3, 15 Dec 65-14 Mar 66 (Technical).
by Sturger Wagner, and Mauro Walker. Jul 66, 44p
Contract DA-28-043-AMC-01424 (E)
Proj. DA-1p6-22001-A056
Task 02
ECOM-01424-3
See also AD-631 491.

Descriptors: (*Integrated circuits, Manufacturing methods), (*Encapsulation, Integrated circuits), Costs, Vapor plating, Glass, Performance (Engineering).

Evaluation studies of evaporated and vapor plated glass have led to the recommendation that only the vapor plated glass process be used in continuing the remainder of the program. Vapor plated glass has shown superior properties as a dielectric and in mobile charge content. An important consideration is the compatibility of vapor plated glass with existing metalization systems. A number of construction methods have been evolved and proven feasible, although several problems remain. However, the problems are basically those of processing and thus capable of resolution during fabrication of the test vehicles. Continued improvements in batch assembly techniques have led to more reproducible and better defined solder joints. Further electrical evaluations have been made of devices to determine the effects of glassing. These evaluations have also evidenced the superiority of vapor plated glass. An error in one of the masks proved to be responsible for a saturation voltage problem. A specification question has arisen because of the rather wide range of leakage currents resulting from gold doping. This leakage current variation made the test vehicles which were constructed unsatisfactory for environmental testing. A revised approach to the final exploratory development models is recommended to permit emphasis on the construction techniques which utilize vapor plated glass. (Author)

AD-635 190 **Field 9A, 9B**
CFSTI Prices: HC$3.00 MF$0.50
Westinghouse Electric Corp., Elkridge, Md. Molecular Electronics Div.
MOS INTEGRATED CIRCUITS.
Quarterly rept. no. 3, 1 Jan-31 Mar 66.
by T. Sikina, J. Tsai, H. van Beek, and C. Roe. Jun 66, 38p
Contract DA-28-043-AMC-01515 (E)
Proj. DA-1P6-22001-A-056
Task 1P6-22001-A-05602
ECOM-01515-3

Descriptors: (*Integrated circuits, *Transistors), Metals, Oxides, Semiconductors, Substrates, Processing, Silicon, Epitaxial growth, Computer storage devices, Precision finishing.

Identifiers: MOS transistors, Metal oxide semiconductors.

The reports contains the results on the process improvements to develop an integrated semiconductor memory utilizing complementary MOS transistors. Various factors which affect process control were investigated. An optimum structure for obtaining complementary regions of p-type and n-type silicon is given. Complementary pairs of normally-off n-channel and p-channel devices were obtained both on separate and on a single substrate material. The cleanliness during the process is an important factor which affects the reproducibility and the uniformity of the device characteristics. (Author)

AD-635 198 **Field 9A, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Martin Co., Baltimore, Md.
RADIATION EFFECTS ON INSULATED GATE FIELD EFFECT (MOS) INTEGRATED CIRCUITS.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 66.
by David M. Long, and H. L. Flesher. Jul 66, 24p
MND-3264-3
Contract DA-28-043-AMC-01520 (E)
ECOM-01520-3
Sponsored by DASA.

Descriptors: (*Integrated circuits, *Radiation damage), Metals, Oxides, Semiconductors, Transistors, Solid state physics, Theory, Ionization, Surface properties, Voltage, Electrons, Electric fields.

A report is given which covers the third quarter's effort of a radiation effects study on insulated gate field effect MOS integrated circuits. The activity for the quarter was concentrated on pulsed radiation testing at the Martin Flash X-Ray Facility and Rensselaer Polytechnic Institute Linear Accelerator Facility, and on the preparation for neutron tests at DORF. The date reported here are for the transient current response of the gate or drain lead of a 'dummy' MOS device packaged in a TO-5 can and an empty TO-5 socket, as a function of bias, and for the transient response of the gate or drain lead of six n-channel depletion and eight p-channel enhancement MOS transistors. The peak transient drain current for the p-channel units was measured to range from -460 to ;620 microamperes and from 110 to 700 microamperes for the n-channel units. The data were taken at 1.6 x 10 to the 7th r/sec with the magnitude and duration of the response being a function of gate resistance and gate voltage. Measurements of the response of specially fabricated 'dummy' MOS devices have demonstrated that the devices tested have a larger response (300 microamperes) when leads are positively biased than when the leads are negatively biased (-78 microamperes). The data also show that the current response is nonlinear with voltage and that interaction between leads can occur. This interaction is a function of the relative magnitude and polarity of the bias on adjacent leads. (Author)

AD-635 218 **Field 9A, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Hughes Aircraft Co., Fullerton, Calif.
EFFECT OF TRANSISTOR DESIGN PARAMETERS ON RADIATION RESPONSE (POWER TRANSISTORS).
Quarterly technical rept. no. 3, 1 Jan-31 Mar 66.
by Vincent R. Honnold, Gary D. Thomas, and Jerome J. Mazenko. Jul 66, 21p FR-66-17-182
Contract DA-28-043-AMC-01541 (E)
ECOM-01541-3
See also AD-630 836. Supported in part by DASA.

Descriptors: (*Transistors, Radiation damage), (*Neutron reactions, Transistors), Silicon, Analysis of variance, Programming (Computers), Transients, Design.

The objective of the program is to determine particular design characteristics and fabrication techniques for a silicon planar power transistor that will minimize the effects of ionization and lattice displacements caused by high energy radiation. The Third Quarter was devoted to writing a digital computer program to perform an analysis of variance on the experimental data previously obtained and performing the irradiations on the first group of experimental devices. The report describes the experimental procedure used in conducting the neutron irradiation, the writing of the digital computer program and its checkout, and, finally, a sample analysis of variance at a low injection level. (Author)

AD-635 244 **Field 9A**
CFSTI Prices: HC$4.00 MF$0.50
Illinois Univ., Urbana.
BIPOLAR NEGATIVE RESISTANCE FROM METAL-OXIDE-METAL STRCUTURES.
Master's thesis.
by Charles Wesley Mitchell. 1966, 40p
Contract AF 33 (608)-1237

Descriptors: (*Semiconductor devices, Preparation), Resistance (Electrical), Negative resistance circuits, Metals, Oxides, Semiconducting films, Transistors, Stability, Mechanical properties, Electrical properties.

Identifiers: Assistors.

Results of an effort to fabricate a practical metal-oxide-metal negative resistance device (termed an assistor) are reported. No such device was forthcoming, and it is concluded that thin-film techniques seem to be the ultimate answer to the problem.

AD-635 258 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
SOVIET HIGH VOLTAGE TRANSMISSION LINES: SUMMARY OF DATA.
Supplemental rept. no. 3 on ATD work assignment no. 13.

8 Jun 66, 64p ATD-66-63
TT-66-61681
Based on Soviet open sources pub. 1958-1966.

Descriptors: (*Transmission lines, USSR), Voltage, Maps, Specifications, Distribution, Power plants (Establishments), Electric power praduction.

This summary of data is based on Soviet open sources pub. 1958-1966. It is the third supplemental report and it contains data on the technical features and location of major high voltage transmission lines in the USSR (lines 110 kv and above). The study is preceeded by a history of Soviet high voltage transmission line development entitled 'Chronology of transmission line construction'. Four maps present the following data: Distribution of electric power stations and power systems of the USSR, transmission lines linking largest electric power stations in the Ukrainian SSR, electric power flow in the Ukrainian power grid (in 1962), and existing and planned high voltage transmission lines (110-500 kV) in Siberia for the 1959-65 period. Following the maps is a section on transmission line specifications giving minimum clearances of overhead cables, cable specifications, and basic data for Soviet high voltage trrnsmission towers. An alphabetical listing (157 items) of Soviet high voltage transmission lines is included. There are 155 references listed at the end of the report; in addition, there are 6 footnoted references. (Author)

AD-635 287 **Field 9A, 20L, 20E**
CFSTI Prices: HC$2.00 MF$0.50
Northeastern Univ., Boston, Mass.
INVESTIGATION OF SOLID STATE DEVICES AND MATERIALS.
by Basil L. Cochrun. 1Feb 66, 34p Scientific-1
Contract AF 19 (628)-4759
Proj. AF-4608
Task 460805
AFCRL-66-368

Descriptors: (*Semiconductor devices, Test methods), Noise, Gain, Frequency, Thermal stability, Materials, Contamination, Surface properties, Diodes (Semiconductor), Lasers, Gallium alloys, Arsenic alloys, Line spectrum.

Identifiers: Gallium arsenide.

Procedures and techniques were developed for the purpose of evaluating new semiconductor active devices. The characteristics of interest are noise, gain, frequency limits of operation and temperature stability. Theoretical and experimental results indicate that the potential discontinuity associated with metal-semiconductor junctions is dependent upon interface contaminations and surface state effects. A study of materials and fabrication techniques led to more efficient diode lasers. A theoretical explanation was derived for the fine structure of the far-field radiation pattern exhibited by GaAs diodes. (Author)

AD-635 298 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Radio Corp. of America, New York. Communications Systems Div.
HIGH PERFORMANCE THIN FILMS FOR MICROCIRCUITS (CAPACITORS).
Quarterly progress rept. no. 4, 1 Dec 65-28 Feb 66.
by Frank Huber, and Walter Witt. Jul 66, 48p
Contract DA-28-043-AMC-01230 (E)
Proj. DA-1CO-24401-A348-00-54
ECOM--1230-4
See also AD-632 141.

Descriptors: (*Capacitors, *Films), (*Microminiaturization (Electronics), *Circuits), Hafnium compounds, Oxides, Sputtering, Anodic coatings, Thickness, Hafnium, Oxidation, Capacitance, Leakage (Electrical), Life expectancy.

The report includes experimental results of the first twelve month's investigation of the fabrication of thin film hafnium - hafnium dioxide capacitors. Sputtered hafnium films were deposited on glass and anodized by both wet and plasma anodization processes. Wet anodization offers the advantage of larger range of forming voltage (up to 250V) as compared to the maximum forming voltage of about 60 for the plasmionic process. The temperature coefficient of capacitance has been measured to be + 124 ppm/C over the temperature range from -196C to 300C, and as low as + 40 ppm/C over smaller temperature ranges (+ 25C to 125C). Up to several hundred kHz, the capacitance is practically frequency insensitive and a Q of 50 has been measured at 22 MHz. Breakdown voltages frequently exceed the forming voltage by 50 percent or more. Life test data for wet anodized capacitors indicate changes less than 1% over several thousand test hours at room temperature of at 125C. The wet anodized capacitors exhibit small leakage currents (10-8 to 10-12 a/mm2) in the forward and backward direction, practically without preferred current flow in either direction. A dielectric constant of 45 was measured for the hafnium oxide. (Author)

AD-635 386 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Texas Instruments, Inc., Dallas. Semiconductor-Components Div.
THIN FILMS FORMED BY ELECTROCHEMICAL REACTIONS.
Quarterly rept. no. 9, 1 Dec 65-28 Feb 66.
by M. J. F. Gaze. Jul 66, 38p TI-03-66-42
Contract DA-36-039-AMC-02324 (E)
Proj. DA-1C0-24401-A112
Task 1C0-24401-A11204
ECOM-02324-9
See also AD-631 034.

Descriptors: (*Integrated circuits, Preparation), (*Films, Sputtering), (*Dielectric films, Preparation), (*Resistors, Films), Tantalum alloys, Gold alloys, Manganese compounds, Oxides, Doping, Capacitors.

This report summarizes the work performed to develop techniques for fabricating thin conductive, resistive and dielectric films by complete or partial oxidation of a suitable metallic film deposited in predetermined patterns and sequences. Gold-tantalum alloys have been reactively sputtered successfully, using separate cathodes at different potentials for each metal. Sample gold-doped tantalum resistors from ideal slices were evaluated for temperature coefficient and power dissipation, and life tests were begun to evaluate the merits of the material. The resistors produced are characterized by temperature coefficient of resistance (TCR) values of less than 100 ppm/C, and extremely high power dissipation of the order of 1 to 5 watts/square inch. The resistors are readily etched, and sheet resistances up to 300 ohms/square are possible. No additional work was done to improve the deposition process. The advantage of an improved TCR does not justify additional effort since a similar or better TCR may be achieved using nichrome resistors of the same ohm/square value. Development of the sputtering system has required additional time to correct several design and/or manufacturing faults revealed during system test. (Author)

AD-635 480 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR A GERMANIUM PNP POWER TRANSISTOR.
Quarterly progress rept. no. 4, 15 Jan-14 Apr 66.
by Dan Sullivan, and Paul Greer. 14 Apr 66, 43p
Contract DA-36-039-AMC-06161 (E)
Proj. DA-26099
See also AD-629 893.

Descriptors: (*Transistors, *Germanium), Manufacturing methods, Reliability (Electronics), Failure (Electronics), Processing, Performance (Engineering).

Progress is reported of continuing process evaluation tests, analyzing data on tests completed, reviewing the electrical parameter correlation problem on the Third Engineering Sample, preparing Group B Inspection data for the Preproduction Sample, modifying test circuits for power stress tests, preparing sockets required for the Lot Acceptance Test of Production devices, updating the SP1882H specification, and preparing for the Discriminant Analysis Test and Large Scale Reliability Test. (Author)

AD-635 498 **Field 9A, 13H, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix. Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR SILICON LINEAR INTEGRATED CIRCUITS.
Quarterly progress rept. no. 4, 20 Jan-20 Apr 66.
by Thomas Quaid, John Hatchett, and William Turner. 20 Apr 66, 28p
Contract DA-36-039-AMC-06158 (E)
Proj. DA-25001
See also AD-628 990.

Descriptors: (*Integrated circuits, Silicon), Manufacturing methods, Linear systems, Radio receivers, Frequency modulation, Portable, Mixers (Electronics), Limiters, Radiofrequency oscillators, Radiofrequency amplifiers, Audio amplifiers, Performance (Engineering).

Identifiers: AN/PRR-9.

The report describes the work accomplished to produce silicon linear integrated circuits of the type used in FM receivers. The effort was devoted to the fabrication and evaluation of engineering sample integrated circuits, preparation of specifications and test procedures for the five integrated circuits being developed, and the construction and evaluation of an engineering model receiver. Limiter/squelch and mixer/oscillator circuits were modified and new engineering samples were fabricated. (Author)

N66-16572 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Resear h Center.
A FAST AND ECONOMICAL TECHNIQUE FOR WELDED CORDWOOD ELECTRONIC MODULE FABRICATION.
by J. C. Sturman. Feb 66, 8p NASA-TM-X-1206

Descriptors: *Circuit, *Construction, *Electronic module.

For abstract, see T 66 16.

AD-634 788 **See Field 20A**

AD-634 796 **See Field 14B**

AD-634 801 **See Field 17B**

AD-635 026 **See Field 20L**

AD-635 084 **See Field 9E**

AD-635 123 **See Field 9E**

AD-635 193 **See Field 5A**

AD-635 228 **See Field 20L**

AD-635 400 **See Field 20L**

AD-635 534 **See Field 20N**

9B. COMPUTERS

AD-634 794 **Field 9B, 9E**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.

A CAPACITIVELY COUPLED BISTABLE GAS DISCHARGE CELL FOR COMPUTER CONTROLLED DISPLAYS,
by Robert H. Willson. Jun 66, 74p R-303
Contracts DA-28-043-AMC-00073 (E), Nonr-3985 (08)
Proj. DA-20014501B31F

Descriptors: (*Digital computers, *Display systems), (*Display systems, Discharge tubes), Gas discharges, Capacitance, Sandwich construction, Sparks, Voltage, Gases, Photons, Switching circuits.

The capacitively coupled gas cell is made from a sandwich of three thin glass panels. A hole in the center panel forms the discharge cell and transparent electrodes on the outer surfaces of the outer panels are capacitively coupled into the cell. A simple model of the cell consisting of three capacitors and a spark gap is used to explain the bistable characteristic of the cell and the inherent electrical isolation between cells. The ratio of the firing voltage to the sustaining voltages (the voltage at which the cell refires each half cycle after the cell is first fired) was measured for a number of cells with different gases and different pressures. It is suggested that photon bombardment of the negative surface controls the rapid discharge while, in the slower discharge, ion bombardment of the negative surface controls the discharge. Data is given for a variety of gases and gas mixtures. Switching arrays for coincidently selecting a row and a column of an array of cells are also discussed. (Author)

AD-634 809 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
QUESTIONS IN DESIGNING FOR THE HIGH-SPEED OPERATION OF UNITS AND THE EVALUATION OF THE PRODUCTIVITY OF DIGITAL COMPUTERS.
by E. I. Mamonov. 18 Feb 66, 18p FTD-MT-65-219
TT-66-61583
Edited machine trans. of Inzhenerno-Fizicheskii Institut. Vychislitelnaya Tekhnika; Sbornik Statei (USSR) n2 p8-20 1961.

Descriptors: (*Digital computers, Design), Operation, Effectiveness, USSR, Data storage systems.

Identifiers: Evaluation.

For abstract, see T 66 16.

AD-634 920 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A COMPUTER TECHNIQUE USEFUL FOR SOME PROBLEMS IN THE PARTITIONING THEORY OF SEQUENTIAL MACHINES.
Memorandum rept.,
by William J. Sacco. Mar 66, 16p BRL-MR-1733
Proj. RDT/E-1P014501A14B

Descriptors: (*Combinatorial analysis, *Automata), Theory, Programming (Computers).

Identifiers: Sequential machines.

One of the most powerful theories to emerge in sequential machine theory in the last few years is partitioning theory, as developed principally by J. Hartmanis and R. Stearns. There exist several valuable concepts used in partitioning theory, such as the partition with substitution property, partition pairs, and systems-pairs. Partitioning theory enables one to consider the possibility of realizing a given sequential machine M from interconnected sets of smaller machines. Partitions with substitution property, partition pairs, and systems-pairs play a dominant role in the study of machine decomposition. Methods for generating partitions with substitution property have been given by Hartmanis and F. Farr. This paper presents a computer technique which enables one to verify whether, (1) a partition possesses substitution property, (2) two partitions constitute a partition pair, and (3) two set systems constitute a systems-pair. (Author)

AD-635 057 **Field 9B, 14D**
CFSTI Prices: HC$6.00 MF$1.50
Kearfott Div., General Precision, Inc., Little Falls, N. J.
RELIABILITY ASSURANCE TEST AN/ASN-41 COMPUTER SET, NAVIGATIONAL.
Final rept., Sep 65-Jun 66,
Jun 66, 292p Kearfott-6-66-4
Contract NOw-65-0586-f

Descriptors: (*Navigation computers, *Reliability (Electronics)), (*Quality control, Navigation computers), Failure (Electronics), Computers, Specifications, Test methods, Data.

Identifiers: AN/ASN-41.

The purpose of the test was to establish by testing of representative samples from each production lot that the equipments of each production lot would have a reliability figure of merit of a least 200 hours Mean Time Between Failure (MTBF) at 90% confidence level. A total of 49 AN/ASN-41 Navigational Computer Sets were tested. Eighteen (18) were tested under the qualification plan and a total of 31 were tested in three sampling tests. The Reliability Qualification and the three Reliability Sampling Tests were satisfactorily completed for each production test and results approved by the resident DCASO office.

AD-635 179 **Field 9B**
CFSTI Prices: HC$6.00 MF$1.50
Navy Electronics Lab., San Diego, Calif.
PROGRAMMING IN NELIAC MOD 7 WITH MOD 7 STAR OPERATING SYSTEM.
A self instructional manual.
by James A. Saxon, and Marnette Moles. Feb 66, 278p

Descriptors: (*Programming languages, *Programming (Computers)), Instruction manuals.

Identifiers: Neliac program.

For abstract, see T 66 16.

AD-635 215 **Field 9B, 12B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
TIME-SHARING OPERATIONS AND MANAGEMENT.
by F. T. Fiala. 30 Mar 66, 20p SP-2417
Contract AF 19 (628)-5166, ARPA Order-773
Prepared for presentation at the Data Processing Management Association Conference, Chicago, Ill., 20-24 Jun 66.

Descriptors: (*Operations research, *Digital computers), (*Management engineering, Digital computers), Computer operators, Scheduling.

Identifiers: Time sharing (Computers), AN/FSQ-32.

This paper describes the operation of the Time-Sharing System now in use in the Research and Technology Laboratory of the System Development Corporation. The scope of the paper covers the operator's duties, plant layout, and considerations that operations managers should be giving to present and inherent problems posed by the new methods of computer operations. (Author)

AD-635 216 **Field 9B, 12B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
DYNAMIC PROGRAM BEHAVIOR UNDER PAGING.
by Gerald H. Fine, Calvin W. Jackson, and Paul V. McIssac. 16 Jun 66, 22p SP-2397
Contract AF 19 (628)-5166, ARPA Order-773
Prepared for presentation at the National ACM Conference (21st), Los Angeles, Calif., 30 Aug-1 Sep 66.

Descriptors: (*Operations research, *Digital computers), Programming (Computers), Tests, Management planning.

Identifiers: Time sharing (Computers), AN/FSQ-32.

This paper presents empirical data on the dynamic behavior of programs with respect to a time-sharing paging environment. A selection of popular programs constituting a considerable fraction of the normal work load on the existing SDC Time-Sharing System was examined. The entire service spectrum, ranging from conversational to production-type requests, was represented by various aspects of these programs. Data were obtained by interpretive execution of the machine instructions for these programs and are presented in the form of page-demand and usage graphs. The implications of this information for the efficient utilization of page-turning concepts on the next generation of time-sharing computers are discussed. (Author)

AD-635 229 **Field 9B, 5H**
CFSTI Prices: HC$3.00 MF$1.00
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
FLEXOWRITER/DIOA SYSTEM.
Technical rept.
by Charles Amann, and Melvin Klerer. Feb 66, 91p TR-124, CU-149-66-ONR-266-Phys
Contract Nonr-266 (84)

Descriptors: (*Input-output devices, Programming (Computers)), Punched tape, Typewriters, Modules (Electronic), Computer logic, Data processing systems, Computers.

Identifiers: Flexowriters.

The report documents the hardware used to interface the Friden Flexowriter to the GE-235 computer in use at Hudson Laboratories. This hardware can also be used as a general purpose interface for low speed data transmission. (Author)

AD-635 325 **Field 9B**
CFSTI Prices: HC$7.00 MF$1.50
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
PROGRAM DOCUMENTATION OF A USER-ORIENTED PROGRAMMING SYSTEM - PART I.
Technical rept.
by Melvin Klerer, and Jack May. Jan 66, 165p TR-118, CU-142-66-ONR-266-Phys
Contract Nonr-266 (84)

Descriptors: (*Programming (Computers), Instruction manuals), Programming languages, Coding.

Operating instructions for on-line and off-line editing and imaging. The purpose of the report (together with Tech. repts. AD-635 339, AD-635 340, and AD-635 341) is to list in GAP assembly language the program that constitutes the software of the system. Such a listing, together with the line coding comments, should be of assistance to anyone who wishes to extend the system or recode it in another environment. The report contains (a) Listing for Pass no. 0: Writes error messages on magnetic discs which may be called if errors are encountered in passes 1, 2, and 3. (b) Listing for Pass no. 1: Reads paper tape off-line or on-line input from remote terminal. Controls editing and listing. Converts two-dimensional form to linear FORTRAN-like language. Writes function, special variable and image table onto discs. (c) Operating instructions for on-line and off-line editing and imaging. (d) Switch settings. (Author)

AD-635 330 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
HARDWARE DOCUMENTATION OF A USER-ORIENTED PROGRAMMING SYSTEM.
Technical rept.
by Melvin Klerer. Jan 66, 25p TR-123, CU-147-66-ONR-266-Phys.
Contract Nonr-266 (84)

Descriptors: (*Input-output devices, *Programming (Computers)), Documentation, Programming languages, Data processing systems, Typewriters.

Identifiers: Flexowriters.

The purpose of the report is to list the ordering information of parts necessary to modify an OFF-LINE/ON-LINE Flexowriter so that it has the input/output capability necessary for the user-oriented programming system. The required electrical, mechanical, and assembly information is included.

AD-635 339 **Field 9B**
CFSTI Prices: HC$6.00 MF$1.25
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
PROGRAM DOCUMENTATION OF A USER-ORIENTED PROGRAMMING SYSTEM. PART III.
Technical rept.
by Melvin Klerer, and Jack May. Jan 66, 126p TR-120, CU-144-66-ONR-266-Phys
Contract Nonr-266 (84)

Descriptors: (*Programming (Computers), Instruction manuals), Programming languages, Coding.

The purpose of the report (together with Tech. repts. AD-635 325, AD-635 340, and AD-635 341 is to list in GAP assembly language the program that constitutes the software of the system. Such a listing, together with the line coding comments, should be of assistance to anyone who wishes to extend the system or recode it in another environment. The report contains the listing for Pass no. 3: Generates assembly language code. Generates space availability for dimensioned variables. Calls in GAP assembler. (Author)

AD-635 340 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
PROGRAM DOCUMENTATION OF A USER-ORIENTED PROGRAMMING SYSTEM, PART II.
Technical rept.
by Jack May, and Melvin Klerer. Jan 66, 42p TR-119, CU-143-66-ONR-266-Phys.
Contract Nonr-266 (84)

Descriptors: (*Programming (Computers), Instruction manuals), Programming languages, Coding.

The purpose of the report (together with Tech. repts. AD-635 325, AD-635 339, and AD-635 341) is to list in GAP assembly language the program that constitutes the software of the system. Such a listing, together with the line coding comments, should be of assistance to anyone who wishes to extend the system or recode it in another environment. The report contains the listing for Pass no. 2: Converts linear language into reverse Polish notation. Computes floating point constants. Prints error messages for Pass no. 3. (Author)

AD-635 341 **Field 9B**
CFSTI Prices: HC$5.00 MF$1.25
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
PROGRAM DOCUMENTATION OF A USER-ORIENTED PROGRAMMING SYSTEM, PART IV.
Technical rept.
by Melvin Klerer, and Jack May. Jan 66, 103p TR-121, CU-145-66-ONR-266-Phys.
Contract Nonr-266 (84)

Descriptors: (*Programming (Computers), Instruction manuals), Programming languages, Coding.

The purpose of the report (together with Tech. repts. AD-635 325, AD-635 339, and AD-635 340) is to list in GAP assembly language the program that constitutes the software of the system. Such a listing, together with the line coding comments, should be of assistance to anyone who wishes to extend the system or recode it in another environment. The report lists all subroutines which are used at run time (Pass no. 4). (Author)

AD-635 379 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
HARDWARE DOCUMENTATION OF A GENERAL PURPOSE PAPER TAPE READER.
Technical rept.
by Charles Amann, and Melvin Klerer. Mar 66, 21p TR-125, CU-150-66-ONR-266-Phys.
Contract Nonr-266 (84)

Descriptors: (*Punched tape, Instrumentation), (*Input-output devices, Design), Computers, Documentation.

Identifiers: Paper tape readers.

The electronic design and operating instructions for a general purpose paper tape reader are given. The reader will interface with a GE-235 computer and transmit any arbitrary 8-bit code. (Author)

AD-635 473 **Field 9B**
CFSTI Prices: HC$4.00 MF$0.75
System Development Corp., Santa Monica, Calif.
GRAMMAR AND LEXICON FOR BASIC JOVIAL.
Technical memo.
by Millard H. Perstein. 10 May 66, 105p TM-555/005/00

Descriptors: (*Programming languages, Instruction manuals), Compilers, Grammars, Linguistics, Syntax, Semantics, Programming (Computers).

Identifiers: JOVIAL.

This is the reference manual for the Basic JOVIAL version of the JOVIAL language. Basic JOVIAL is a subset of J3, which is the full language. This manual defines the full syntax and semantics of Basic JOVIAL without drawing fine distinctions between the two aspects. (Author)

N66-15367 **Field 9B**
CFSTI Prices: HC$4.00 MF$0.75
Stanford Univ., Calif. Microwave Lab.
A COMPUTER PROGRAM FOR ELECTRON OR ION GUN ANALYSIS. OPERATIONS MANUAL.
Interim rept.
by V. Hamza. Sep 65, 113p ML-1369
Contract NAS3-4100
NASA-CR-54738

Descriptors: *Computer program, *Electron gun, *Fortran, *IBM 7090 computer, *Space charge.

For abstract, see T 66 16.

N66-15808 **Field 9B**
CFSTI Prices: HC$6.00 MF$1.25
Stanford Research Inst., Menlo Park, Calif.
FLUX SWITCHING IN MULTIPATH CORES.
by V. W. Hesterman, and D. Nitzan. Jul 65, 205p Rept. no. 4
Contract NAS7-100
NASA-CR-69565

Descriptors: *Ferrimagnetism, *Magnetic core, *Switching circuit.

N66-16048 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Western Development Labs. Philco Corp., Palo Alto, Calif.
CERTAIN COMPUTER PROGRAMS.
Quarterly progress rept. no. 4.
24 Sep 65, 63p WDL-TR-2605
Contract NAS5-9700
NASA-CR-69694

Descriptors: *Error detecting code, *Tape, *Computer program, *Trajectory analysis.

PB-169 825 **Field 9B, 6B, 6D**
CFSTI Prices: HC$1.10 MF$0.50
Minot Information Devices, Lexington, Mass.
TOWARD UNDERSTANDING BY DEVICE.
by Otis N. Minot. 1962, 7p
Availability: Published in Pub. as Proceedings of the San Diego Symposium for Biomedical Engineering 19-21 Jun 62, San Diego, Calif. NSF Scientific Documentation Project.

Descriptors: (*Computers, Performance (Engineering)), Reasoning, Problem solving, Data processing systems, Learning, Cybernetics, Man-machine systems, Programming languages.

The purpose of the paper is to suggest how machines can, in effect, understand more, through more and better information, procedures and organization.

WAPD-TM-414 **Field 9B, 18I**
CFSTI Prices: HC$2.00 MF$0.50
Bettis Atomic Power Lab., Pittsburgh, Pa.
M0341: A DIGITAL COMPUTER PROGRAM FOR CALCULATION OF STEAM GENERATOR EQUIVALENT GEOMETRIES.
by E. J. McGowan. Mar 66, 25p
Contract AT (11-1)-GEN-14

Descriptors: (*Digital computers, Generators), (*Steam, Programming (Computers)).

For abstract, see N 20 14.

AD-634 785 See Field 4A
AD-634 819 See Field 5A
AD-634 821 See Field 12B
AD-634 915 See Field 8B
AD-634 997 See Field 5J
AD-635 006 See Field 9A
AD-635 009 See Field 9D
AD-635 163 See Field 5B
AD-635 164 See Field 5B
AD-635 190 See Field 9A
AD-635 195 See Field 17G
AD-635 227 See Field 13G
AD-635 264 See Field 9E
ANL-7146 See Field 7D
IDO-17140 See Field 18H
MiscPub-276 See Field 5B
PB-169 555 See Field 13F

PB-169 570 See Field 13F

PB-170 542 See Field 12A

SC-M-66-8 See Field 13I

SC-M-66-8A See Field 13I

SC-R-66-846 See Field 5B

9C. ELECTRIC AND ELECTRONIC ENGINEERING

AD-450 189 Field 9C, 14B
CFSTI Price: HC$3.60
Army Missile Command, Redstone Arsenal, Ala. Electromagnetics Lab.
DYNAMIC MEASUREMENT OF PHASE SHIFT AND AMPLITUDE,
by John R. Kay. 19 Jun 64, 37p RE-TR-64-3
Proj. DA-1R242103D225

Descriptors: (*Microwave amplifiers, Test methods), (*Phase shift, Measurement), Reflectometers, Frequency, Gain, Phase meters, Phase (Electronics), Phase measurement, Time, Phase detectors.

Test procedures and techniques were investigated for swept frequency measurements of phase and amplitude characteristics of microwave amplifiers and related components, as functions of both time and frequency. Techniques are applicable to production line testing where test time must be minimized but accuracy must be maintained. Data are accurate and comprehensive over a broad frequency range. A reflectometer system is used for swept frequency gain measurements. A commercially available phase test set is used for swept frequency phase measurements. (Author)

N66-15818 Field 9C
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
A SOLID-STATE LOW-NOISE PREAMPLIFIER.
by D. O. Hansen, and N. L. Roy. Jun 65, 13p
STL-4158-6011-TU-000
Contract NASw-936
NASA-CR-69575

Descriptors: *Particle detector, *Solid State Device, *Electrostatic generator, *Preamplifier.

N66-15818 Field 9C
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
A SOLID-STATE LOW-NOISE PREAMPLIFIER.
by D. O. Hansen, and N. L. Roy. Jun 65, 13p
STL-4158-6011-TU-000
Contract NASw-936
NASA-CR-69575

Descriptors: *Particle detector, *Solid state device, *Electrostatic generator, *Preamplifier.

N66-18021 Field 9C
CFSTI Prices: HC$4.00 MF$0.75
Hazeltine Electronics Div., Hazeltine Corp., Little Neck, N. Y.
STUDY REPORT FOR THE MANNED SPACECRAFT VIDEO MONITOR.
by D. B. Shaw. 12 Nov 65, 101p Rept. no. 10173
Contract NAS9-4551
NASACR-65226

Descriptors: *Display system, *Spacecraft Electronic equipment, *Monitor, *Video equipment, *Cathode ray tube.

AD-434 100 See Field 9A

AD-458 145 See Field 9A

AD-635 265 See Field 5F

PB-170 211 See Field 14B

PB-170 212 See Field 14B

9D. INFORMATION THEORY

AD-466 441 Field 9D, 17B
CFSTI Price: HC$2.00
Cruft Lab., Harvard Univ., Cambridge, Mass.
SIGNAL DETECTION USING A NOISY REFERENCE SIGNAL.
by John G. Proakis. 29 Apr 65, 43p Technical rept. TR-465
Contract Nonr-1866 (16)
Proj. NR-372-012

Descriptors: (*Pulse communication systems, Pulse discriminators), (*Radio signals, Discriminators), Noise (Radio), Radio receivers, Demodulation, Mathematical analysis, Communication theory, Equations, Phase (Electronics), Monte Carlo method, Simulation, Digital computers, Errors, Tables, Statistical analysis, Digital systems, Coding, Distortion, Probability, Matched filters.

In digital communications, one is frequently confronted with the problem of signal discrimination under the added uncertainty of imprecise knowledge of the signaling waveforms. This added uncertainty is usually caused by the channel over which the signaling waveforms are transmitted. In this report, we consider the problem of discriminating among M signal waveforms which are of the form v (t)=s j (t; theta) + n (t), 0 less than or equal to t less than or equal to T, j = 1,2,..., M where theta is a dst of n unknown constant parameters and n (t) is gaussian noise. The receiver for detecting the signals is designed on the basis of an estimate theta estimate of the signal parameters which is derived from prior received waveforms of signal plus noise. Our major effort is devoted to the derivation of the estimate theta estimate which turns out to be an approximation to the maximum likelihood estimate of theta. This estimate is compared with three alternate estimators for theta that have been considered. For the specific case in which the unknown parameter is the signal phase phi, the effect of the four different estimates for phi on the performance of a binary and a quaternary communications system is evaluated by means of a Monte Carlo simulation of the systems on a digital computer. The error rates that resulted from the simulation are summarized in tabular form. (Author)

AD-634 989 Field 9D
CFSTI Prices: HC$4.00 MF$1.00
Sylvania Electronic Systems, Waltham, Mass. Applied Research Lab.
CYCLIC CODES. RESEARCH PROGRAM TO EXTEND THE THEORY OF WEIGHT DISTRIBUTION AND RELATED PROBLEMS FOR CYCLIC ERROR-CORRECTING CODES AND CONSTRUCTIVE CODING THEORY.
Final rept., 1 Jun 61-31 Mar 66.
by E. F. Assmus Jr, H. F. Mattson Jr, and R. Turyn. 28 Apr 66, 133p F-1015-2
Contract AF 19 (604)-8516
Proj. AF-5628
Task 562801
AFCRL-66-348

Descriptors: (*Coding, Theory), Groups (Mathematics), Statistical analysis.

Identifiers: Error-correcting codes, Cyclic codes.

Each perfect code on q symbols which corrects e errors 'contains' a tactical configuration of type (q-1) to the e th power; (e + 1)- (2e + 1)-n, where n is the block length. The H-Golay codes also 'contain' in the case q=2 a closed k-th order Steiner system, and for q > 2 an analogous new configuration. An error in the literature is pointed out. A lower bound on the number of inequivalent Steiner triple systems is established. Work of Lloyd and Golay on perfect codes is recast. Other necessary conditions for perfect codes are also derived. We give an updated account of previous work on weights in quadratic-residue codes, and improve on the square-root bound on the minimum distance. The H-Golay code of type (n, n-k) over GF (q) is cyclic if and only if the gcd (k, q-1) is 1. Minimum weights in several cyclic codes are determined. The possible isomorphism of the combinatorial designs defined by certain difference sets with identical parameters is studied. At most two of the designs considered are isomorphic. (Author)

AD-635 009 Field 9D, 9B
CFSTI Prices: HC$3.00 MF$0.75
Army Electronics Command, Fort Monmouth, N. J.
CODING STUDIES OF REAL CHANNEL DATA BY COMPUTER SIMULATION.
Technical rept.
by Edward D. Moyes, and Robert W. Taylor Jr.
May 66, 78p ECOM-2701
Task 1P6.20501.A448.02

Descriptors: (*Coding, Optimization), (*Programming (Computers), Information theory), Radio communication systems, Ionospheric propagation.

Block codes have not obtained the error correction capabilities as originally predicted since most error bits are highly correlated to adjacent bits; therefore, errors have a tendency to occur as bursts rather than random errors. The interleaving concept makes these bursts appear as random errors; hence, the errors can be corrected by block codes. Data collected over an ionospheric path from Davis, California, to Deal, New Jersey, was used with computer simulation to determine an optimum interleaver size and an optimum block code that could be used for this particular path. (Author)

AD-635 145 Field 9D
CFSTI Prices: HC$3.00 MF$0.75
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
RESEARCH STUDY IN DIGITAL COMMUNICATION CODES.
Final rept., 1 Dec 63-30 Nov 64.
by Arthur E. Laemmel. Feb 66, 84p PIBMRI-1298-65
Contract DA-36-039-sc-89219
Proj. DA-1PO-14501-B14A-02-39
See also AD-632 423.

Descriptors: (*Coding, Digital systems), (*Information theory, Coding), Binary arithmetic, Graphics, Sequential analysis, Transformations (Mathematics), Data transmission systems.

Digital codes for information compression are studied, together with some related topics in theory of sequential machines. The material is written in eight sections which will provide a systematic organization for a possible book on the subject. Conjectures and problems are given at several points where it is believed further research will yield useful theorems. Some of the results obtained apply to general digital transformations (not just compression), but little emphasis is placed here on error reduction. (Author)

AD-635 488 Field 9D, 5J, 17B, 20A K
CFSTI Prices: HC$4.00 MF$1.00
Federal Scientific Corp., New York.
MODEL 245C SIMORAMIC DOUBLE-SPECTRUM ('CEPSTRUM') ANALYZER FOR EXTRACTION OF PITCH DATA.
Final rept. Sep 64-Sep 65.
by Mark R. Weiss. 15 Feb 66, 134p FSC-F/148
Contract AF 19 (628)-4389
Proj. AF-4610
Task 461002
AFCRL-66-145

Descriptors: (*Pitch discrimination, *Spectrum analyzers), (*Speech, Spectrum analyzers), (*Auditory signals, Spectrum analyzers), Information theory, Speech recognition, Sound pitch, Wave analyzers, Wiring diagrams.

Identifiers: Cepstrum, Simoramic double-spectrum analyzer.

A new technique of pitch extraction has been implemented which makes use of the double spectrum analysis of speech signals. In contrast to previous applications of this method of extracting pitch, the system described here operates in real-time and does not require the use of a computer. In this implementation, the waveforms of speech spectra, obtained by use of a Model 254 SIMORAMIC Spectrum Analyzer, are scanned by an analyzer of the stepped-filter type to obtain the desired pitch values. Tests of this instrument show that it provides reliable pitch data even when the signal-to-noise ratio is very poor and the fundamental component of voiced speech is missing. Spurious signals such as hum and narrow band noise, even when much greater than the speech signal, do not affect the accuracy of pitch extraction. The analyzer potentially is capable of detecting and extracting pitch data for multiple talker inputs. (Author)

AD-635 015 See Field 20F

AD-635 462 See Field 17B

9E. SUBSYSTEMS

AD-634 792 **Field 9E, 20N**
CFSTI Prices: HC$27.80 MF$1.50
Defense Research Lab., Univ. of Texas, Austin.
DIELECTRIC WAVEGUIDES AND RADIATORS.
Doctoral thesis,
by Chester M. McKinney Jr. Sep 50, 282p
Bumblebee-138
Contract NOrd-9195
Task 2

Descriptors: (*Waveguides, Dielectrics), (*Dielectrics, Radio transmission), (*Antennas, Dielectrics), Rods, Antenna radiation patterns, Propagation, Attenuation, Measurement, Experimental data, Theory, Gain.

The work which is described in this dissertation consisted of an experimental investigation of the properties of the dielectric waveguide and radiator of circular cross section. Part One is a description and discussion of the metal waveguides and mode exciters used in this project. The designs of three new types of mode exciters are described. These exciters are for the TM sub 01 and TM sub 11 modes in metal waveguides of circular cross section and for the TE sub 20 mode in waveguides of rectangular cross section. Part Two covers measurements made on dielectric rods used as waveguides and is principally a collection of data that were obtained in order to check existing theoretical calculations. In particular, measurements were made on dielectric rods of sufficiently large diameter to support the second order radial modes of propagation. Attenuation measurements were made as a function of the diameter of the rods and also as a function of a bending of the rods. Part Three constitutes the major part of the work and consists of measurements made on dielectric radiators. It is believed that this is the first investigation of dielectric rod antennas excited in the TM sub 01, TE sub 01, and EH sub 11 modes.

AD-634 829 **Field 9E, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Lenkurt Electric Co., Inc., San Carlos, Calif.
NETWORK GROUP, HYBRID CIRCUIT OA-7424 (XW-1)/FCC-17 (FOUR-WIRE TERMINATION SET).
Technical rept., Phase B,
by Forrest N. Easley, and T. R. Holmes. 20 May 66, 28p
Contract AF 30(635)-11188
RADC-TDR-63-529-Vol-2
See also AD-625 549.

Descriptors: (*Multiplex, Networks), (*Networks, Modules (Electronics)), Radio equipment, Voice communication systems, Electric terminals, Compatibility, Reliability (Electronics), Radio communication systems.

Identifiers: AN/FCC-17.

This report contains a summary of the Category I testing of the Four-Wire Termination Set. This equipment was fabricated under the Phase B provisions in Contract AF30 (635)-11188 and was designed and developed for use with the Multiplexer Set AN/FCC-17 to provide two-wire termination for 12 four-wire voice frequency circuits. The Category I testing phase of the Four-Wire Termination Set development was accomplished to determine compliance with design requirements of Lenkurt Specification 805-02735 and to evaluate the performance of the Four-Wire Termination Set Phase B equipment. After testing the Phase B equipment in accordance with the Category I Test Plan, it is concluded that the equipment is highly reliable and fully compatible with Multiplexer Set AN/FCC-17 and is fully within the specifications set forth in Lenkurt Specification 805-02735. (Author)

AD-634 871 **Field 9E, 22B**
CFSTI Prices: HC$3.00 MF$0.75
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missiles and Space Systems Div.
VIBRATION AND SHOCK TESTING OF MULTILAYER PRINTED WIRING BOARDS,
by A. Koudounaris. May 66, 63p SM-49159

Descriptors: (*Pannel boards (Electricity), *Printed circuits), Environmental tests, Vibration, Shock (Mechanics), Circuit interconnections, Manned spacecraft, Performance (Engineering), Welding, Soldering.

This report covers the vibration and shock test results and procedures which comprised one phase of the multilayer printed wiring board development program. Sample multilayer boards, with and without flatpacks, were subjected to vibration and shock testing preceded by temperature cycling and shock, per MIL-STD 202; these tests were followed by high altitude testing. The boards were subjected to the most rigorous vibration and shock conditions likely to be encountered by electronic assemblies in a manned launch vehicle. There were no through-hole or welded lead connection failures. There was one soldered lead connection failure. (Author)

AD-634 911 **Field 9E, 20L**
CFSTI Prices: HC$5.00 MF$1.00
Radio Corp. of America, Camden, N. J. Defense Electronic Products.
MICROELECTRONIC SOLID-STATE DISPLAY ASSEMBLY.
Final development rept., 8 Jun 65-7 Jul 66.
7 Jul 66, 186p
Contract NObsr-93320
Proj. SR-008-0303
Task 9371

Descriptors: (*Microminiaturization (Electronics), Display systems), (*Display systems, Electroluminescence), (*Cadmium alloys, Selenium alloys), Semiconductor devices, Electronic switches, Sandwich construction, Hysteresis, Configuration, Intermetallic compounds, Performance (Engineering).

Identifiers: Cadmium selenide.

The purpose of this program was to perform configuration and fabrication studies which might improve the performance of CdSe-EL display panels. Treatment parameters, handling, and conditions of application of the CdSe were also studied with regard to their influence on the variability of the hysteresis effect. The configuration studies included a comparison of the sandwich structure and gap structure constructions of CdSe-EL panels. The sandwich structure was found to be more practical to fabricate. The fabrication techniques that were investigated included studies on binders, solvents, curing procedures, temperature and humidity effects, postfire treatments, sizes and types of wire electrodes, packing density, the occurrence of electrical and optical cross-coupling of CdSe-EL panels was also performed. The most significant results were obtained in the postfire treatment experiments and in the investigations of cross-coupling. As found in the postfire treatments, the proper treatment can increase the threshold to cutoff ratio of a particular batch of CdSe. It was also found that various specific treatments can reduce the degree of variation (in hysteretic behavior) from batch to batch. The investigations of cross-coupling showed that better performance can be obtained from CdSe-EL panels if electrical and optical isolation between CdSe elements is provided. (Author)

AD-634 992 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
PERTURBATION METHODS FOR OBTAINING DIFFERENTIAL PHASE SHIFTS IN A CIRCUMFERENTIALLY MAGNETIZED FERRITE PHASE SHIFTER,
by R. E. Eaves Jr, and D. M. Bolle. Jun 66, 42p
Scientific-1
Contract AF 19(628)-5846
Proj. AF-5635
Task 563503
AFCRL-66-402

Descriptors: (*Perturbation theory, *Phase shift), (*Phase shifters, Phase shift), Ferrites, Waveguides, Numerical analysis.

The problem considered is the differential phase shift produced by a circumferentially magnetized tube of ferrite coaxially located in a circular waveguide operating in circularly symmetric TE modes. A general perturbational formula is developed for differential phase shift in waveguides containing arbitrary anisotropic media and is then applied to the stated problem. Numerical results are presented and compared to those obtained from an exact solution. (Author)

AD-635 084 **Field 9E, 9A**
CFSTI Prices: HC$1.50 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
PERFORMANCE OF P-N JUNCTION GALLIUM ARSENIDE AVALANCHE (TRANSIT-TIME) OSCILLATORS.
by Vincent J. Higgins, Frank A. Brand, and Joseph J. Baranowski. Apr 66, 25p ECOM-2696
Task DA-1L0-13001-A-91A-54-00

Descriptors: (*Microwave oscillators, *Avalanche diodes), Gallium alloys, Arsenic alloys, K band, X band, Pulse generators, Performance (Engineering).

Identifiers: Gallium arsenide.

The report presents preliminary results on the generation of microwave energy from epitaxial gallium arsenide varactor diodes biased into avalanche. These diodes were originally designed to be used in a low-noise parametric amplifier or high-efficiency harmonic generators. An experimental measurement technique using a signal substitution method is fully described. The measurement technique allows one to fully isolate and examine characteristics of the frequency of oscillation without use of filters and to examine any frequency of oscillation between 6.0 and 50 GHz. Details of experimental results on both CW and pulsed oscillators are given. Pulsed oscillations were observed between 7.89 and 31.2 GHz with specific

data tabulated. CW oscillation output of over 20 mW in K sub u band, 13.4 GHz with efficiencies of 4/5 per cent was observed. Specific data such as CW output variation with bias current, efficiency variation with bias current, etc., are presented. In addition, parametrically related oscillation and diode tunability are discussed. (Author)

AD-635 100 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Syracuse Univ. Research Inst., N. Y.
INVESTIGATION OF GROUND ANTENNA CHARACTERISTICS.
Final technical rept., 1 Feb 62-31 Jan 66.
by David K. Cheng. May 66, 32p
Contract AF 30 (602)-2646
Proj. AF-4506
Task 450604
RADC-TR-66-208
See also AD-631 450.

Descriptors: (*Antenna arrays, Antenna radiation patterns), Radar antennas, Antenna apertures, Phase arrays, Helical antennas, Data processing systems, Scattering, Plasma sheath, Transmission lines, Standing wave ratios, Antenna lobes, Slot antennas.

The purpose of this work was to conduct theoretical study, mathematical analysis and experimental verification of research-type problems related to the advancement of the state-of-the-art in the field of antenna for ground-based applications. Sixteen individual tasks were completed in technical areas related to array antennas, transmission lines, electromagnetic wave scattering and field measurements. Typical tasks in these areas include: studying the effects of removal of elements on array antenna radiation patterns; developing design techniques for reducing side lobe radiation in linear and planar arrays; examining and minimizing VSWR caused by multiple discontinuities in transmission lines; experimentally examining mutual coupling effects in arrays; and developing a new technique for measuring diffraction fields. Work accomplished on each task undertaken during the course of this investigation has been published in separate technical reports and is summarized in this report. Individual task reports should be consulted for technical details.

AD-635 123 **Field 9E, 9A, 13H**
CFSTI Prices: HC$4.00 MF$0.50
Piezo Technology, Inc., Orlando, Fla.
PEM FOR FILTER, QUARTZ CRYSTAL 112 Mc, TYPE EL-FR (X-2) AND CRYSTAL UNIT, FILTER, QUARTZ TYPES CR (XM-64)/U AND CR (XM-65)/U.
Quarterly progress rept. no. 4, 1 Aug 65-30 Apr 66.
by W. H. Horton. 30 Apr 66, 41p
Contract DA-36-039-AMC-03638 (E)
See also AD-624 309.

Descriptors: (*Crystal filters, Quartz), (*Band-pass filters, Quartz), (*Quartz, Resonators), (*Quartz resonators, Very high frequency), Crystals, Performance (Engineering), Design, Parametric amplifiers.

Identifiers: EL-FR (X-2)crystal filter, CR (XM-64)1U crystal unit, CR (XM-65)/U crystal unit.

The report reviews the contractual and specification modification which became effective during the report period and describes progress on the fabrication of engineering samples of crystal CR (XM-65)/U and filter EL-FR (X-2). (Author)

AD-635 143 **Field 9E, 13H, 7E**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Schenectady, N. Y. Research and Development Center.
PHOTOMETALLIC PROCESS INVESTIGATION.
Interim development rept. no. 2, 1 Mar-31 May 66.
by D. L. Schaefer, and J. F. Burgess. 14 Jun 66, 26p
Contract NObsr-95045
See also AD-631 330.

Descriptors: (*Photoengraving, Integrated circuits), (*Integrated circuits, Preparation), (*Etching, *Photochemistry), Gold, Nickel alloys, Chromium alloys, Chlorine compounds, Bromine compounds, Iodine compounds, Photosensitivity, Spectroscopy, Photolysis, Polymers, Solvents, Compatibility, Reaction kinetics, Microminiaturization (Electronics).

Identifiers: Nichrome.

The project has as its ultimate objective the fabrication of microminiature circuits in gold, nichrome, aluminum and silica by a process in which these materials are etched directly by a photosensitive material according to an incident light pattern. The evaluation of potential light sensitive halogens was extended. Spectrophotometric studies of chloro, bromo and iodo systems for etching gold were conducted. Etchant products are identified and etching mechanisms are proposed. Studies of the compatibility of polymers, solvents, and photo etchants were conducted. Reaction rate studies were initiated. The production of circuit patterns in gold and nichrome by several photometallic systems was demonstrated. (Author)

AD-635 208 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Singer Co., Bridgeport, Conn. Metrics Div.
FREQUENCY CONVERTER CV- (TX)-URM-85.
Final rept.
by Markus Epstein. Jun 66, 28p
Contract DA-36-039-AMC-00125 (E)
Proj. DA-1E6-20501-D-449-01-09
ECOM-00125-F

Descriptors: (*Frequency converters, Tuning devices), Very low frequency, Low frequency, Interference analyzers, Compatibility, Gain, Bandwidth, Stability.

Identifiers: CV- (TX)-URM-85 Frequency converter, AN/URM-85.

The aim of this final report is to discuss the results of the investigation, analysis, and design techniques used in developing the frequency converter CV- (TX)-URM-85, a 14 Kc to 150 Kc plug-in tuning unit, to extend the frequency range of the Radio Interference Measuring Set AN/URM-85. The tuning unit is mechanically and electrically compatible with the main unit of the AN/URM-85 which is known as Receiver, Radio 1040/URM-85. Each special design consideration or problem is presented along with conclusions and recommendations. Test results relating frequency, gain and bandwidth stability vs. temperature are presented.

AD-635 264 **Field 9E, 9B**
CFSTI Prices: HC$3.00 MF$0.50
Missouri Univ., Columbia.
PARAMETRIC AMPLIFIER.
Master's thesis.
by Carl W. Meyer. Jun 66, 56p
Contract AF 33 (608)-1254

Descriptors: (*Parametric amplifiers, Experimental design), Programming (Computers), Electrical engineering.

Identifiers: FORTRAN.

The use of computer techniques allows for the saving of valuable time in accurately designing a lumped circuit parametric amplifier. To show the development of such a computer program, the general theory of parametric amplifiers will be discussed with some equation development. The necessary conditions for parametric amplification is then outlined as the amplification criterion and a circuit containing basically four tuned tanks, a varactor, and load resistor, operating at one megacycle is shown to meet the parametric amplification criterion. From the knowledge of the necessary conditions for parametric amplification and the circuit equations developed, a complete computer program is developed to verify that a circuit and varactor will operate as an amplifier. The only information that needs to be included in the FORTRAN program is the desired operating signal and pump frequencies, the value of one component of the tank circuits and the characteristics of the varactor. If the conditions for parametric operation are satisfied, the computer will then determine the remaining circuit components, retaining only those which are realizable. The program also selects the best operating conditions from the many hundreds available. For each point selected, the computer will determine, among other things, the negative resistance and the component values of the impedance matching networks. (Author)

AD-635 268 **Field 9E, 17C**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana.
A SIMULATION STUDY OF ELEVATION ANGLE OF ARRIVAL MEASUREMENTS IN THE WULLENWEBER RDF SYSTEM.
Master's thesis.
by Harold Charles Schlicht. 1966, 68p
Contract AF 33 (608)-1237

Descriptors: (*Direction finding, Simulation), (*Angle of arrival, *Antenna arrays), Dipole antennas, Digital computers, Measurement, Programming (Computers).

Identifiers: Wullenweber antennas.

The thesis is concerned with a study of the characteristics of the Wullenweber Antenna System, and in particular, determination of the vertical angle of arrival, called the Elevation Angle, of an incoming signal. The study reveals a number of possible methods of determining the elevation angle of an incoming signal, with a view to determining whether or not a practical system does in fact exist. The research involved the following tasks: (1) implementation of each of the various schemes which had been selected for study into a digital computer program; (2) data acquisition through simulation of the system on a digital computer; and (3) synthesis and organization of the data into a form suitable for interpretation.

AD-635 286 **Field 9E, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Electronic Systems Command, Patuxent River, Md. NANEP Branch.
TECHNICAL INVESTIGATION OF SWEEP CALIBRATION TECHNIQUES.
Interim rept.
by W. Simon. 16 Jun 66, 34p
Task 10973

Descriptors: (*Coaxial filters, *Calibration), Test sets, Test methods, Sweep generators, Spectrum analyzers, Low-pass filters, Scanning.

Several methods for rapid calibration of coaxial devices were investigated. Stress was placed upon the applicability of each method to out-of-band frequency ranges, i. e., those frequencies outside the limits in which the manufacturer guarantees performance. This report contains the results of Phase I of the investigation: a survey of present techniques. Phase II will consist of applying the appropriate techniques in calibrating the coaxial devices utilized by the NANEP Spectrum Signature Field Team. (Author)

AD-635 472 **Field 9E, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME PRACTICAL CONSIDERATIONS FOR REDUCING THE SURFACE RESISTIVITY OF X-BAND COMPONENTS.
Technical rept., (revised ed.).

by Alan H. Kessler. 13 Jun 66, 58p LL-TN-1965-41
Contract AF 19 (628)-5167
Proj. AF-649L
ESD-TR-66-242
Revision of manuscript submitted 11 Aug 65.

Descriptors: (*Waveguides, *Attenuation), X band, Surface properties, Electroplating, Microwaves, Beryllium alloys, Casting alloys, Coatings, Dielectrics, Metal coatings, Degradation, Copper alloys, Corrosion inhibition.

In an experimental study program involving X-band waveguide components, various factors affecting RF resistivity were investigated. Specific results of this investigation included: (1) the successful reduction of the RF resistivity of conventional beryllium copper castings by electroplating with higher conductivity metals, (2) decreasing RF resistivity by lowering surface roughness, (3) the attainment of microwave components cast from a higher conductivity casting alloy than beryllium copper, (4) lowering of the RF resistivity by minimizing the effects of surface oxides and subsurface contaminants, (5) the use of OFHC and electroformed copper components to achieve low RF resistivity, and (6) an evaluation and comparison of dielectric and metallic protective coatings which inhibit the deterioration of waveguide surfaces. (Author)

AD-635 487 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Genisco Technology Corp., Los Angeles, Calif. Genistron Div.
DEVELOPMENT AND EVALUATION OF 60 CYCLE AND 400 CYCLE TRANSFORMER-FILTERS.
Final rept.
by Walter K. Grossmann. 6 May 66, 60p
Contract NBy-62194
NCEL-CR-66.006

Descriptors: (*Electric filters, Radiofrequency interference), Design, Performance (Engineering), Transformers, Graphics, Alternating current.

Identifiers: Transformer filters.

This report contains final design and performance data of the Genistron BP-814 and BP-815 Transformer-Filters. The report also compares theoretical findings with the measured performance of the filters by means of graphical presentation of essential parameters. A discussion of these results permits selection of an optimum trade-off between parameters for future designs. Finally, a qualitative assessment of features, with regard to anticipated usage, is formulated as a general description and compared with established devices of similar performance. (Author)

AD-635 507 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Harry Diamond Labs., Washington, D. C.
ELECTROSTATICALLY FOCUSED BACKWARD-WAVE OSCILLATOR DEVELOPMENT.
by Burton J. Udelson. Apr 66, 66p TR-1318
Projs. DA-1P523801A300, HDL-96393

Descriptors: (*Backward-wave oscillators, Focusing), (*Electron beams, Backward-wave oscillators), Electrostatics.

A program was undertaken at HDL with the objective of developing a backward-wave oscillator (BWO) that would have the properties required for fuzing application (e.g., compact size, light weight, rugged structure, etc.). The BWO was designed to operate at C-band, and utilized two parallel ladder lines that acted both as an rf slow-wave structure and also as the electrostatic-focusing structure for an electron sheet beam. With the knowledge of the basic ruggedness of the ladder-line structure, and of the feasibility of constructing small, lightweight tubes, the BWO program was aimed primarily at achieving satisfactory electrical performance. RF power outputs of the order of 50 mW were obtained, even though misalignments of the ladder-line structure reduced the beam transmission to the collector. Much higher power outputs are visualized for tubes of this design in which satisfactory alignment is achieved. The BWO development program was terminated because of a shift of emphasis in the requirements of HDL systems. The details of fabrication are given for both mechanical designs that were employed during the course of the program, one utilizing a Kovar-glass envelope, and the other consisting of ceramic-metal construction throughout. Some suggestions are also offered as to the direction of future developmental work. (Author)

AD-635 535 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Radiation, Inc., Melbourne, Fla.
STUDY OF ANTENNA PATTERN SYNTHESIS.
Final rept. Jan 64-Jun 66.
by Donald R. Rhodes. 15 Jun 66, 14p
Contract AF 19 (628)-4007
Proj. AF-4600
Tasks 460007, 460010
AFCRL-66-420
See also AD-607 135.

Descriptors: (*Antennas, Theory), (*Antenna radiation patterns, Synthesis), Antennas, Antenna apertures, Special functions (Mathematical).

An investigation into the foundations of the theory of solid-angle pattern synthesis for planar antennas is reviewed. The principal results include a fundamental principle in the theory of planar antennas, the development of properties of a class of doubly orthogonal functions that are the most natural for representing both aperture and pattern functions, and the derivation of formulas for stored magnetic and electric energies needed to constrain the synthesis solution to insure physical realizability. (Author)

PB-169 975 **Field 9E**
CFSTI Price: HC$2.60
Motorola, Inc., Chicago, Ill.
SINGLE SIDEBAND AND HIGH FREQUENCY MECHANICAL FILTERS.
Final rept., 1 Jan-29 Feb 60.
by B. Niederman, and L. Kaminsky. 29 Feb 60, 26p
Contract DA-36-039-sc-78156
Proj. DA-3-26-07-703
AD-240 759

Descriptors: (*Filters (Electromagnetic wave), Design), Band-pass filters, Sidebands, Radiofrequency filters, Ceramic materials, Ferrites, Miniature electronic equipment.

A summary of the major items investigated during the course of this contract is included. It includes transducer material (ferrite and ceramic), high frequency operation, shear mode investigation and motion reversal. Thirty SSB mechanical filters, delivered as part of the contractual requiremceramic end ents, are discussed and representative response curves for each of the three types (metallic, ferrite and plate filters) are included. Miniaturization possibilities with ceramic end plates are discussed. A representative response of one of the ten subfilters is included. Also included is a detailed description of the End Section Assembly Technique. (Author)

AD-450 431 **See Field 3B**

AD-634 788 **See Field 20A**

AD-634 794 **See Field 9B**

AD-634 974 **See Field 20N**

AD-635 048 **See Field 20N**

AD-635 313 **See Field 20L**

SC-R-66-846 **See Field 5B**

9F. TELEMETRY

AD-634 863 **Field 9F, 14B**
CFSTI Prices: HC$5.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
TELEMETERING PICKUPS,
by F. L. Verwiebe, and G. T. Kirkland. Oct 48, 61p Bumblebee-85
Contract NOrd-7386

Descriptors: (*Telemeter systems, *Transducers), Telemetering transmitters, Pressure gages, Accelerometer, Gyroscopes, Temperature sensitive elements, Dynamometers, Tachometers, Flowmeters, Voltmeters, State-of-the-art reviews.

Identifiers: Bumblebee telemetering system.

Pickups were designed and constructed to measure a wide variety of physical quantities for transmission from test vehicles to ground stations. These designs have been subject to the rigid requirements and configurations of-flight-test vehicles, the important requisites being ruggedness, compactness, and accuracy. The physical quantities measured include pressure, acceleration, temperature, orientation, force, and velocity. Most of the pickup instruments are of the variable inductance type, in which a physical change effects a variation in inductance and, consequently, a corresponding frequency change in a subcarrier oscillator. The important constructional features of the inductance units and the various types of pickups are described and calibration techniques and performance characteristics are discussed. Also included are proposals for future modifications and improvements. (Author)

AD-635 105 **Field 9F, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
A PORTABLE SIGNAL SIMULATOR AND DECOMMUTATOR FOR PULSE POSITION MODULATION TELEMETRY.
Instrumentation papers,
by J. Leon Poirier. May 66, 30p AFCRL-IP-96, AFCRL-66-315
Proj. AF-4642
Task 464201

Descriptors: (*Telemeter systems, *Pulse position modulation), Telemetering data, Simulators, Signal generators, Commutators, Demodulators, Test equipment (Electronics), Calibration, Sounding rockets.

Identifiers: Decommutators, Trailblazer.

This report describes the operation of a Pulse Position Modulation telemetry signal simulator and a decommutator that are used for testing and calibrating payloads for Trailblazer II vehicles. The simulator generates dual polarity Pulse Duration Modulation or Pulse Position Modulation modulating signals of several widths. The decommutator performs the functions of decommutation, PPM to PDM conversion, and frame-synchronization signal generation. The units are designed to operate at the standard commutation rate of 900 samples per second with a frame rate of 20 frames per second. (Author)

N66-15816 **Field 9F**
CFSTI Prices: HC$7.00 MF$2.00
IBM Federal Systems Div, Rockville, Md.
A ROD DESIGN FEASIBILITY REPORT, VOLUME I AND II.
Final rept.
20 Mar 63, 365p IBM-TR-023-022
Contract NAS8-5098
NASA-CR-69571

Descriptors: *Airborne range + orbit determination (AROD), *Equipment specifications, *Systems design.

For abstract, see T 66 16.

PB-170 360 **Field 9F, 17B, 13B**
CFSTI Prices: HC$1.00 MF$0.50
Wyoming State Highway Dept. Planning and Research Div.
RADIO CONTROLLED COUNTER RESEARCH STUDY.
1 May 66, 18p 0482
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Data transmission systems, Radio transmission), (*Radio communication systems, Civil engineering), (*Traffic, Counting methods), (*Telemeter systems, Civil engineering), Roads, Vehicles, Volume, Electronic recording systems, Remote control systems.

This report describes a research study using radio transmission as a medium to convey the vehicular traffic count from a remote traffic counting station into the State headquarters office. The objective of the study was to determine the value of using radio transmission for traffic counting in terms of dependability, accuracy, range (distance from central office), and reduction of personnel time in field service of the State's counting station. The report describes in detail some of the problems encountered with the installation and operation of the system. Tabulation of traffic count for several months operation of the system is contained in the report with an error percentage calculated from the field count and the office count. (Author)

10A. CONVERSION TECHNIQUES

AD-635 170 **Field 10A, 12A**
CFSTI Prices: HC$4.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
AN APPROXIMATE NUMERICAL METHOD OF CALCULATING A THREE-DIMENSIONAL FLOW IN A STEAM-TURBINE STAGE.
ATD work assignment no. 88.
by L. A. Shubenko-Shubin, and V. F. Poznakhirev. 20 Apr 66, 13p ATD-66-48
TT-66-61676
Trans. of Teploenergetika (USSR) n11 p25-9 1965. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Numerical methods and procedures, Three-dimensional flow), (*Three-dimensional flow, *Steam turbines), USSR.

To obtain a closed system of differential equations describing the motion of steam or gas through a stage of an axial-flow turbomachine, it is necessary to define additional conditions. The importance of the additional conditions as the main factors determining the design of the stage blades is shown. The equations of motion and continuity are written in terms of the heat drop and the geometric characteristics of the stage. This form of the expression permits the definition of the initial, boundary, and additional conditions, which are based on the real stage blade design, the utilization of the available design experience, and the evaluation of the stage from the point of view of strength, and fabrication and economic requirements. The analysis of the problem of three-dimensional flow through a stage of an axial-flow turbomachine has shown that four types of problem formulation are possible and a certain solution method is necessary for each one. By solving the equations of motion and continuity simultaneously, the heat-drop derivative in the axial direction is eliminated, thus making it possible to reduce the solution of the problem to the solution of an ordinary first-order differential equation using the method of lines. Since the hypothesis that the flow in the turbine is axisymmetric introduces a substantial error into the calculation results, a method is proposed which makes it possible to approximately account for the non-uniformity of the flow while retaining the mathematical advantages of the axisymmetric circulation technique. (Author)

N66-15365 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.50
Harshaw Chemical Co., Cleveland, Ohio. Crystal-Solid State Div.
RESEARCH AND DEVELOPMENT IN CD S PHOTOVOLTAIC FILM CELLS.
Quarterly rept. no. 1, 28 Jun-28 Sep 65.
by T. A. Griffin, E. R. Hill, and J. C. Schaefer.
1965, 51p
Contract NAS3-7631
NASA-CR-54856

Descriptors: *Photovoltaic cell, *Solar cell, *Cadmium sulfide.

For abstract, see T 66 16.

N66-15370 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.75
American Cyanamid Co., Stamford, Conn. Research Labs.
DEVELOPMENT OF HIGH-PERFORMANCE LIGHT-WEIGHT ELECTRODES FOR HYDROGEN-OXYGEN FUEL CELLS.
Quarterly rept. no. 2, 6 Jul-5 Oct 65.
by W. P. Colman, J. Di Palma, and D. Gershberg.
27 Jan 66, 66p
Contract NAS3-6477
NASA-CR-54866

Descriptors: *Hydrox fuel cell, *Electrode.

N66-15375 **Field 10A**
CFSTI Prices: HC$4.00 MF$0.75
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
TWO STAGE POTASSIUM TEST TURBINE.
Quarterly progress rept. no. 16, 8 Feb-8 May 65.
by E. Schnetzer. 1965, 115p
Contract NAS5-1143
NASA-CR-54643

Descriptors: *Potassium, *Two-stage turbine.

N66-15376 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.75
New Mexico Univ., Albuquerque. Bureau of Engineering Research.
A THEORETICAL AND EXPERIMENTAL STUDY OF LOW VOLTAGE, HIGH CURRENT DC TO AC CONVERTERS WHICH USE EITHER MAGNETORESISTORS, SUPERCONDUCTORS, HALL EFFECT DEVICES, OR THIN-FILM DEVICES.
Final rept.
by R. Bechtel, and W. W. Grannemann. Dec 65, 96p EE-131
Grant NsG-279-62
NASA-CR-69268

Descriptors: *Alternating current (AC), *Direct current (DC), *Hall effect, *Converter, *Superconductor, *Thin film.

N66-15380 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
New Mexico Univ., Albuquerque. Bureau of Engineering Research.
METHODS FOR DC TO AC CONVERSION.
Semiannual status rept.
by R. Bechtel, and W. W. Grannemann. Jul 65, 17p PR-64
Grant NsG-279-62
NASA-CR-69339

Descriptors: *Alternating current (AC), *Conversion, *Direct current (DC), *Metal oxide semiconductor (MOS), *Thin film.

N66-16560 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A PHOTOVOLTAIC SOLAR SENSOR FOR USE IN SPACECRAFT ORIENTATION CONTROL SYSTEMS.
Master's thesis.
by A. Fontana. Feb 66, 36p NASA-TN-D-3279

Descriptors: *Control system, *Photovoltaic cell, *Attitude control, *Solar sensor.

AD-635 007 **See Field 19A**

AD-635 032 **See Field 7D**

10B. POWER SOURCES

AD-419 523 **Field 10B**
CFSTI Price: HC$2.60
Engelhard Industries, Inc., Newark, N. J. Research and Development Div.
HYDROGEN GENERATION FOR FUEL CELLS.
Quarterly rept. no. 1, 1 May-31 Jul 62.
by E. J. Emerson, M. F. Collins, and P. A. Danna.31 Jul 62, 25p Rept. no. 1a
Contract DA-36-039-sc-89077
Task 3A99-09-002-03

Descriptors: (*Fuel cells, Gas generating systems), (*Hydrogen, Fuel cells), (*Gas generating systems, Portable), Ammonia, Hydrocarbons, Decomposition, Purification, Membranes, Combustion, Aromatic compounds, Propanes.

Identifiers: Reforming (Chemistry).

Investigations demonstrated that it is possible to develop a method of producing pure hydrogen from ammonia vapor in a small, lightweight portable generator. A prototype generator was built and successfully operated. Pure hydrogen was separated from cracked ammonia by means of a diffusion membrane. The unit contained proprietary ammonia oxidation catalyst, an integral battery operated igniter coil for starting the process and used an aspirator to supply the air necessary for combustion to furnish the process energy requirements. Investigations on hydrocarbon fuels demonstrated that No. 55 Naphtha or Propane may be employed as hydrogen source material in a steam reforming process. (Author)

AD-419 524 **Field 10B**
CFSTI Price: HC$2.60
Engelhard Industries, Inc., Newark, N. J. Process Equipment Div.
HYDROGEN GENERATION FOR FUEL CELLS.
Quarterly rept. no. 2, 1 Aug-31 Oct 62.
by E. J. Emerson, Lionel Kantrowitz, and H. H. Geissler. 31 Oct 62, 27p Rept. no. 2a
Contract DA-36-039-sc-89077
Task 3A-99-09-002-03

Descriptors: (*Fuel cells, Gas generating systems), (*Hydrogen, Fuel cells), (*Gas generating systems, Portable), Ammonia, Hydrocarbons, Decomposition, Operation, Construction, Combustion, Jet engine fuels.

Identifiers: JP-4 fuels, Reforming (Chemistry).

An improved more rugged prototype portable hydrogen generator utilizing ammonia feed was built and successfully operated. Continued investigations have shown that the design requirements of 4 SCFH of hydrogen can be produced. The unit was operated at a pressure of 35 psig, corresponding to the vapor pressure of ammonia at 22F. The generator utilized residual hydrogen to supply the process energy requirements. The air for combustion was supplied by an aspirator. Design conversions and hydrogen yields were obtained with thermal efficiencies, defined as ratio of gross heating value of hydrogen to gross heating value of fuel,

of about 60-65%. Repeated start ups and shutdowns were accomplished without mechanical failure. Investigations on hydrocarbon fuel have shown that it is possible to steam reform JP-4 jet fuel and obtain conversion levels and hydrogen yields sufficient to operate a generator at specified design conditions. (Author)

AD-424 671 **Field 10B**
CFSTI Price: HC$2.60
Engelhard Industries, East Newark, N. J.
HYDROGEN GENERATION FOR FUEL CELLS.
Quarterly rept. no. 5, 1 May-31 Jul 63.
31 Jul 63, 28p
Contract DA-36-039-sc-89077
Task 1G6-22001-A053-04
See also AD-414 542.

Descriptors: (*Fuel cells, Gas generating systems), (*Gas generating systems, Hydrogen), (*Hydrogen, Fuel cells), Ammonia, Hydrocarbons, Decomposition, Ignition, Control systems, Petroleum, Catalysts.

Test operations were continued with a portable hydrogen generator utilizing ammonia as the fuel. An improved startup procedure using the coil igniter system, and an auxiliary igniter system as a secondary procedure, were developed. A modification in the ammonia feed regulator resulted in a more reliable control component. The design study to detail a selected hydrocarbons consuming hydrogen generator was approximately 50% completed. The process calculations were finalized, the major components sized and materials of construction selected. Investigations on a selected hydrocarbon fuel, BTX-Udex raffinate, over proprietary catalyst C-3212 at a mols of water per carbon atom ratio of 3.0 demonstrated sufficient catalyst life for both continuous and cyclic operation. Preliminary test results demonstrated that an average 15F approach to the equilibrium temperature existed. (Author)

AD-462 346 **Field 10B, 7E, 22B**
CFSTI Price: HC$4.00
Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF 4 MeV ELECTRONS ON COVERED BRITISH SILICON SOLAR CELLS.
Technical rept.
by F. C. Treble. Feb 65, 26p TR-65026

Descriptors: (*Solar cells, Electron bombardment), (*Silicon, Electron bombardment), Light, Solar radiation, Measurement, Degradation, Electrical properties, Intensity, Calibration, Distribution, Performance (Engineering), Satellites (Artificial).

An experimental study has been made of the effects of 4 MeV electron bombardment on the spectral response and orbital performance of two British makes of 10 ohm cm n/p silicon solar cells with cemented-on 0.006in. glass cover slips. A subsidiary purpose of the study was to compare the latest measurement techniques employing short circuit current calibrations in the laboratory with those in Malta sunlight. The two methods were found to give results in close agreement. A factor relating the mean Malta calibration to the air mass zero short-circuit current was established and found to be remarkably insensitive to shifts in spectral response of the cells. The results of the study are presented as a series of mean spectral response and voltage-current curves showing the effect of various radiation fluxes. The performance parameters of interest are also plotted as a function of electron flux. The probably fall in solar cell output during the life of the UK.3 satellite is predicted from the data. (Author)

AD-634 810 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
SILICON SOLAR BATTERIES,
by A. Ya. Gliberman, and A. K. Zaytseva. 19 Jan 66, 84p FTD-MT-64-204
TT-66-61584
Trans. of mono. Kremniievye Solnechnyye Batarei, Moscow/Leningrad, 1961, 72p. Massovaya Radio Biblioteka (USSR), v396 72p 1961.

Descriptors: (*Solar cells, Silicon), USSR, Energy conversion, Photoelectric cells (Semiconductor), Photoelectric effect, Absorption, Effectiveness, Impurities, Electrical conductivity.

The pamphlet presents physical principles of work of silicon solar energy photoelectric converters. Considered are electrical and spectral characteristics of instruments and factors affecting magnitude of converter efficiency. Peculiarities of use of solar batteries are characterized. A number of constructions of batteries are described and examples are given of their application in different areas of science and technology. (Author)

AD-634 846 **Field 10B, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Tyro Labs., Waltham, Mass.
RESEARCH ON THE ELECTROCHEMICAL OXIDATION OF HEXANE AND ITS ISOMERS.
Semi-annual interim rept. no. 1, 11 Nov-65-15 May 66,
by S. B. Brummer. 15 May 66, 53p
Contract DA-44-009-AMC-1408 (T)

Descriptors: (*Alkanes, Oxidation), (*Electrochemistry, Alkanes), (*Fuel cells, Hydrocarbons), Adsorption, Ethane, Thermochemistry, Reaction kinetics, Anodes, Chemical bonds, Surfaces.

Identifiers: Hexanes.

The chemical mechanism of the adsorption and oxidation of C3H8 and n-C6H14 on smooth Pt electrodes from 12M H3PO4 at 130C was characterization of the finally-adsorbed residues for C3H8 at 130C; number of sites occupied by each adsorbed C3H8 molecule; role of adsorbed species in the over-all C3H8-to-CO2 reaction; measurement of n-hexane adsorbate; kinectics of n-hexane adsorption; steady-state n-hexane adsorption; present status of anodic hydrocarbon oxidation mechanism.

AD-634 882 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
DENDRITIC SILICON SOLAR CELLS AND UTILIZATION EXPERIENCE,
by Joseph Wise. 1966. 26p AFAPL-CONF-66-7
Proj. AF-8173
Task 817301
Presented at the IEEE Aerospace Conference, Seattle, Wash. Jul 11-15, 1966.

Descriptors: (*Solar cells, Silicon), Epitaxial growth, Phosphorus, Diffusion, Coatings, Quartz, Performance (Engineering), Solar panels, Electric power production.

The method of fabrication for dendritic silicon solar cells of 30 sq centimeters is described; both conventional N on P and N on P drift-field cells are included. The N on P cells are formed through diffusion of phosphorus on the top surface; the drift-field cells, through epitaxial growth of a 40-micron layer on a segment of dendritic silicon web material followed by phosphorous diffusion, antireflection coatings, and integral quartz coatings. Experience in fabricating these cells and in utilizing them on a flexible array is summarized and their potentials for lower weight, longer life, and lower cost are assessed; space performance estimates also are included. The use of the ion implantation junction formation in the fabrication of highly efficient, thin dendritic silicon solar cells also is outlined. Measurements accomplished at the Air Force Aero Propulsion Laboratory on the various cell types are included. (Author)

AD-635 173 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
GENERATOR SETS PU-657/G AND PU-658/G.
Final rept.
by W. R. Helmer. 1 Jul 66, 10p
Proj. 58-66-01

Descriptors: (*Generators, Mobile), Trailers, Performance (Engineering), Alternating current, Diesel engines, Tests.

Identifiers: PU-657/G generator sets, PU-658/G generator sets.

An investigation was made to determine the cross-country mobility of the trailer mounted PU-657G and PU-658/G generator sets.

AD-635 459 **Field 10B, 20I**
CFSTI Prices: HC$4.00 MF$0.75
Allison Div., General Motors Corp., Indianapolis, Ind.
RESEARCH ON PLASMA PROPERTIES OF MAGNETOPLASMADYNAMIC POWER GENERATORS.
Final technical rept., 1 May 63-30 Apr 66.
by Theodore L. Rosebrock, Robert L. Koch, Donald L. Tipton, Ronald O. Whitaker, and Richard T. Schneider. 31 May 66, 100p EDR-4637
Contract Nonr-4104 (00), ARPA Order-420

Descriptors: (*Magnetohydrodynamic generators, Plasma physics), Plasma medium, Stability, Ionization, Helium, Cesium, Hall effect, Fluid flow.

The initial objective of the program was to obtain basic information on the plasma properties of working fluids for magnetoplasmadynamic (MPD) power generators. The experimental portion of this initial program centered on a closed plasma diagnostic loop through which helium seeded with cesium was circulated. Test section temperatures were variable between 1000 and 1800K. New spectroscopic techniques and methods of evaluating observed spectra were developed. The theoretical approach to the problem consisted of developing a mathematical model to describe nonequilibrium plasmas together with supplementary theoretical analyses to aid in design of improved MPD power generators. Instabilities occuring in the plasma flow were treated analytically. Redefinition of program objectives resulted in the demonstration of nonequilibrium ionization in a closed-loop generator operating at 1800K. The working fluid was helium seeded with cesium. The power output accompanying the nonequilibrium ionization was on the order of a few watts. The severe reduction in power level below theoretical predictions was due to Hall shorting within the generator. (Author)

AD-635 496 **Field 10B, 21E**
CFSTI Prices: HC$4.00 MF$0.75
Army Engineer Research and Development Labs., Fort Belvoir, Va.
ENGINEERING DESIGN TEST REPORT OF THE 100-KW, 400-CYCLE, GAS-TURBINE-ENGINE-DRIVEN GENERATOR SET SOLAR MODEL T-350M-5.
Final rept.
by T. David Cooper, and Howard L. Clark Jr. Apr 66, 103p Rept. no. 1852
Task 1D643324D589-03

Descriptors: (*Generators, Tests), (*Gas turbines, Generators), Radar transmitters, Power supplies, Performance (Engineering), Failure (Mechanics).

Identifiers: AN/MPQ-32.

The report covers the engineering design testing and the evaluation of a 100-kw, 400-cycle, gas-turbine-engine-driven generator set for use in the AN/MPQ-32 Radar System, and as a member of

the Army's family of multipurpose prime power packages. The report concludes that the 100-kw, 400-cps, gas-turbine-engine-driven generator set will be suitable for field use by the Army, including the AN/MPQ-32 Radar System, after redesign of the engine roller thrust bearing mounting and retaining means. During the test program other failures occurred which were random in nature or easily correctable without major redesign effort. (Author)

AD-635 503 **Field 10B, 10C, 5A**
CFSTI Prices: HC$4.00 MF$0.75
Institute for Defense Analyses, Arlington Va. Research and Engineering Support Div.
A DOD RESEARCH PROGRAM FOR ELECTROCHEMICAL SCIENCE WITH APPLICATIONS TO ENERGY STORAGE AND CONVERSION.
Dec 65, 108p Study S-208, IDA/HQ 66-4749
Contract SD-50
Task T-24

Descriptors: (*Batteries + components, State-of-the-art reviews), (*Fuel cells, State-of-the-art reviews), (*Electrochemistry, Energy conversion), Primary cells, Secondary cells, Electrodes, Mass transfer, Electrolytes, Research program administration.

The state of the art of batteries and fuel cells is reviewed in some detail. The problem areas in which difficulties are being experienced, and which are limiting the fruitful use of electrochemical devices, are given in detail. The contributing or limiting factors, promising approaches to these problems, and related fundamental research areas are identified. A series of recommendations is made for systematically improving greatly the position of the United States in electrochemical technology and science. The cost of this program is outlined. Details are given in depth of the precise areas and character of the programs suggested in the recommendations. Comparisons are made with the existing program, which is felt to be greatly in need of modification. (Author)

N66-16047 **Field 10B**
CFSTI Prices: HC$6.00 MF$1.50
Goodyear Aerospace Corp., Akron, Ohio.
CONE AND COLUMN SOLAR CONCENTRATOR MODEL.
Final rept.
by T. J. Mc Cusker. Jul 65, 214p GER-12268
Contract NAS1-4341
NASA-CR-66012

Descriptors: *Concentrator, *Solar energy, *Column, *Cone.

For abstract, see T 66 16.

10C. ENERGY STORAGE

AD-634 845 **Field 10C, 1C**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
SEALED NICKEL-CADMIUM BATTERIES FOR AIRCRAFT ELECTRICAL SYSTEMS,
by Gerald H. Miller. Jul 66, 14p AFAPL-CONF-66-6
Proj. AF-8173
Prepared for presentation at the IEEE Aerospace Systems Conference 11-15 Jul 66 at Seattle, Wash.

Descriptors: (*Alkaline cells, Aircraft equipment), Nickel, Cadmium, Power supplies Storage batteries, Maintenance, Performance (Engineering), Seals (Stoppers).

Adapting sealed batteries to aircraft electrical systems is feasible. The major problem to be solved is the development of a suitable charge conditioner to operate with the battery and the aircraft electrical system. The interchanging of vented-cell, nickel-cadmium aircraft batteries with sealed-cell, nickel-cadmium aircraft batteries is considered possible by mid-1968. The major advantages of sealed-cell aircraft batteries are improved flight safety, maintenance-free operation, and improved performance in terms of life and reliability. (Author)

AD-635 490 **Field 10C**
CFSTI Prices: HC$3.00 MF$0.75
Yardney Electric Corp., New York, N. Y.
DEVELOPMENT OF THE HIGH RATE METAL-AIR DEPOLARIZED BATTERIES.
Quarterly technical rept. no. 2, 1 Oct-31 Dec 65.
by Allen Charkey. Jun 66, 64p
Contract DA-28-043-AMC-01614 (E)
Proj. DA-1C0-14501-A-34A
Task 00
ECOM-01614-2
See also AD-632 717.

Descriptors: (*Primary cells, Air), Polarization, Electrolytes, Electrodes, Magnesium, Calcium, Aluminum, Barium, Convection (Heat transfer), Zinc, Cathodes (Electrolytic cell).

The investigation of the magnesium anode included a study of several electrolytes to determine compatibility with both electrodes. In all cases, best performance was obtained in a 'free' electrolyte system. The magnesium-air test cells, used only for exploratory studies, delivered specific energies of 50-55 Watt-hrs./lb. The investigation of calcium, aluminum, and barium air systems is still in an early exploratory stage. Particular interest however, is being given to calcium in an organic-aqueous electrolyte with various corrosion inhibiting agents. Heat transfer by means of air convection was studied over the entire temperature range (-25 to +120F) for the 2C through the C/50 rate of discharge. The testing units employed the zinc-air couple, but the heat transfer and air convection data are suitable for any metal-air battery design. This experimental investigation also indicated that low temperature bootstrap heating operation will be feasible for a zinc-air battery.

N66-15342 **Field 10C**
CFSTI Prices: HC$2.00 MF$0.50
Livingston Electronic Corp., Montgomeryville, Pa.
DEVELOPMENT OF HIGH ENERGY DENSITY PRIMARY BATTERIES.
Quarterly rept. no. 1, 22 Jun-21 Oct 65.
by S. G. Abens, T. X. Mahy, and W. C. Merz. 28 Dec 65, 45p
Contract NAS3-7632
NASA-CR-54859

Descriptors: *Electrolyte, *Copper fluoride, *Electrode, *Lithium fluoride, *Wet cell battery.

For abstract, see T 66 16.

N66-16139 **Field 10C**
CFSTI Prices: HC$5.00 MF$1.00
Globe-Union, Inc., Milwaukee, Wis.
A PROGRAM TO DEVELOP A HIGH-ENERGY DENSITY PRIMARY BATTERY WITH A MINIMUM OF 200 WATT HOURS PER POUND OF TOTAL BATTERY WEIGHT.
Quarterly rept. no. 6, 1 Oct-31 Dec 65.
by W. E. Elliott, J. R. Huff, J. L. Jamrozy, G. D. Mc Donald, and G. L. Simmons. 15 Jan 66, 154p
Contract NAS3-6015
NASA-CR-54873

Descriptors: *Battery, *Cathode, *Lithium, *Vacuum deposition, *Anode, *Copper fluoride.

AD-635 503 **See Field 10B**

11A. ADHESIVES AND SEALS

AD-296 534 **See Field 9A**

AD-635 271 **See Field 17B**

11B. CERAMICS, REFRACTORIES, AND GLASSES

AD-635 029 **Field 11B**
CFSTI Prices: HC$3.00 MF$0.75
Teeg Research, Inc., Detroit, Mich.
INVESTIGATION OF ULTRA HIGH STRENGTH BULK GLASS.
Final rept., Mar 65-Mar 66.
by Robert O. Teeg, Gordon L. Zucker, and Robert W. Hallman. 15 Apr 66, 82p TR-900-008
Contract NOw-65-0388-f

Descriptors: (*Glass, Tensile properties), Boron compounds, Silicates, Lead compounds, Ceramic coatings, Surface properties, Electrical properties, Distillation, Density, Light transmission.

A technique is described by which the intrinsic strength of bulk glass can be measured. The technique is applied to examine the factors which influence the engineering strength of glass. Results of tensile strength measurements on bulk borosilicate glasses, obtained by bending tests, approach theoretical values. Measurement of the temperature dependence of strength in the range 350 to 600 C reveals an interesting strength-temperature transformation. Electrical measurements are also performed in this temperature range in an effort to interrelate electrical and mechanical behavior. Sulfide glass preparation and evaluation techniques are described to provide test specimen composites capable of exhibiting intrinsic strength near room temperature. (Author)

AD-635 055 **Field 11B**
CFSTI Prices: HC$3.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
DYNAMIC PROPERTIES OF PLAIN PORTLAND CEMENT CONCRETE.
Technical rept.
by Walter L. Cowell. Jun 66, 51p TR-R-447
Proj. Y-F008-08-03-401
DASA-13.0181

Descriptors: (*Concrete, *Loading (Mechanics)), Cement, Compressive properties, Tensile properties, Dynamics, Moisture, Statics, Aging (Materials).

Two concrete mixes (a medium- and a high-strength mix), each cured under two different conditions (73F, 100% relative humidity for 26 days followed by 2 days in a 20% RH environment or 73F, 100% RH for 28 days followed by 21 days in a 20% RH environment) were tested to determine the effect of differences in moisture content and rate of loading on their compressive and tensile strengths. The compressive tests showed the values for mechanical properties increased as the rate of loading increased. At the maximum rate of loading (approximately 2,000,000 psi/sec), the increases in compressive strength over the values for static loading for the moist, 28-day concrete were 45% for the medium-strength and 39% for the high-strength concrete. The increases for the drier, 49-day, medium- and high-strength concretes were 35% and 24%. In the splitting tensile-trength tests, at a stress rate of 300,000 psi/sec the increases in tensile strength over the static values for the 28-day concrete were 70% for the medium-strength and 67% for the high-strength mix. For the 49-day concretes, the increases were 53% for the medium-strength and 40% for the high-strength mix. Recommended percentage increases in compressive strength are given for concretes subjected to high strain rates. (Author)

PB-170 478 **Field 11B**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Concrete and Structural Branch.
THE EFFECT OF CHEMICAL COMPOSITION, FINENESS AND WATER REQUIREMENT ON THE QUALITY OF FLY ASH.

by R. L. McKisson. 1 Feb 66, 29p Rept. no. C-1179

Descriptors: (*Concrete, Standards), Combustion products, Chemical properties, Particle size, Moisture, Statistical analysis, Specifications, Ignition.

Identifiers: Fly ash.

Specifications relying heavily on chemical requirements, fineness, and water requirement as a basis for evaluating quality of fly ash are considered limited. A fly ash's quality could best be arrived at by performance-type specifications in which the effect of cements used with the fly ash is also taken into account. Fifteen fly ashes were analyzed statistically to evaluate the influence of chemical composition, fineness, and water requirement on each of several properties of fly ash and portland cement mortar. In general, differences in fineness, chemical composition, and water requirement were not found to have a substantial effect on the mortar, except in the following cases: (1) Ignition loss vs compressive strength, (2) Ignition loss, silicon dioxide and sulfur trioxide content, and water requirement vs drying shrinkage, (3) sulfur trioxide content vs water-cured expansion. It was also demonstrated that in some instances the effect of the particular cement used in a mortar was greater than that of the fly ash. (Author)

AD-432 272 See Field 20L

AD-635 088 See Field 18H

PB-170 516 See Field 11G

USBM-RC-1232 See Field 18J

11C. COATINGS, COLORANTS, AND FINISHES

AD-634 803 **Field 11C, 13J**
CFSTI Prices: HC$3.00 MF$0.75
New York Univ., N. Y. School of Engineering and Science.
DEVELOPMENT OF COATINGS ADHERENT TO METALS UNDER VIBRATION CONDITIONS.
Final rept.,
by Max Kronstein. 20 May 66, 64p
Contract NObs-90357
Proj. NYU-1130

Descriptors: (*Vibration, Coatings), (*Coatings, Steel), (*Transducers, Coatings), (*Paints, Underwater equipment), Liquid immersion tests, Sea water, Ultrasonic radiation, Environmental tests, Cleaning, Pickling, Corrosion inhibition, Paint primers, Plastic paints, Antifouling coatings, Aging (Materials), Adhesion, Failure (Mechanics), Supersonic characteristics, Sound transmission, Sonar equipment.

The factors which influence the life of paint systems on steel under saltwater and ultrasonic vibration were studied. The sonic effects were found to differ in their effect which decreases the adherence of the coating system and their effect which influences the coherence of the coatings with resultant cavitation. A study was made of the form in which the transducer energy is distributed through saltwater. The forms of failure which take place are: loosening of parts of the film from the steel substrate, local pinhole formation, and filament formation. Increased adherence has been found to result from: (a) step-by-step surface preparation, which includes surface inhibition and the driving off of entrapped air in the valleys of the surface profile; (b) the use of primers, including the specification wash-primer (F 117) and a red lead or zinc chromate vinyl primer so applied that there is inter-reaction between one application and the next; (c) avoiding solvent retention in each application before subsequent coatings are applied; (d) bringing the paint system to a desirable state of cross-linking, or polymer state, without going so far as to lose coherence in the paint film. A description of the pre-treatments used and experimental coating systems developed is given and discussed.

AD-634 909 **Field 11C, 13H**
CFSTI Prices: HC$4.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE PROTECTION OF TANTALUM FROM OXIDATION AT HIGH TEMPERATURES WITH ALUMINIUM - 50% TIN COATINGS.
Technical rept.
by R. Moreton. Jan 66, 21p TR-66017

Descriptors: (*Tantalum, *Corrosion inhibition), (*Metal coatings, Corrosion inhibition), Coatings, Aluminum alloys, Tin alloys, Sheets, Great Britain, Defects (Materials), Substrates, Hardening, Ductility, Hardness, Tensile properties.

An Al - Sn coating was investigated as a protection against oxidation of tantalum sheet - a possible material for the combustion chambers of ramjets of hypersonic aircraft. Coatings containing equal parts by weight of Al and Sn were deposited from acetone slurries of the two metals and made impermeable by heating in vacuum for 1/2 hr at 1050C. The coatings, which then consisted of TaAl3 covered with Al - Sn alloy, were assessed by oxidation tests, measurements of substrate hardening and mechanical tests. Tantalum was protected for up to 37 1/2 hr at 1500 C and 3 1/3 hr at 1600 C in air. Some self-healing occurred due to oxidation of molten Al -Sn alloy at defects in the outer oxide layer. Substrate hardening due to nitrogen penetration occurred in test-pieces where no signs of failure had been seen after heating in air at 1500 C. Tensile tests however showed that coated tantalum could be heated in air at 1500 C for up to 8 hr without loss of ductility at room temperature. (Author)

AD-634 951 **Field 11C, 1C**
CFSTI Prices: HC$1.60 MF$0.50
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
FINISH SPECIFICATION.
16 Aug 62, 13p Specification-14359-1
Contract DA-44-177-TC-715
Rept. on VZ-11 Lift Fan Flight Research Aircraft Program.

Descriptors: (*Vertical take-off planes, *Aircraft finishes), Specifications, Protective treatments, Research planes, Finishes + finishing, Coatings, Corrosion inhibition, Aluminum alloys, Magnesium alloys, Titanium alloys, Steel, Pipes, Alloys, Glass textiles.

Identifiers: V-5 aircraft.

The purpose of this specification is to define the finishes necessary to assure adequate surface protection for the materials used in the Army VZ-11 airplanes (Model 143).

AD-635 127 **Field 11C**
CFSTI Prices: HC$1.50 MF$0.50
Canrad Precision Industries, Inc., Chicago, Ill. Sampson Chemical and Pigment Div.
FEASIBILITY STUDY RELATING TO THE DEVELOPMENT OF A NEW HYDROGEN-3 (TRITIUM) ACTIVATED SELF-LUMINOUS COMPOUND.
Final rept.
by S. Isenberg, I. Feuer, W. Goldman, and O. Strongin. 1962, 24p
Contract DA-44-009-eng-5259

Descriptors: (*Paints, *Luminescence), (*Tritium, Luminescence), (*Phosphorescent materials, Paints), Zinc compounds, Sulfides, Hydrides, Excitation, Tritiated compounds, Feasibility studies.

Identifiers: Luminous paints, Zinc sulfides.

Research studies directed towards the development of a self-luminous paint activated by H-3 (tritium) are reported. The results obtained indicate that it is definitely feasible and practicable to incorporate tritium with the structural framework of a zinc sulfide phosphor by means of a carrier agent such as a hydride-forming component.

NBS-BSS-4 **Field 11C**
CFSTI Prices: HC$0.20 MF$0.50
National Bureau of Standards, Washington, D. C. Building Research Div.
WEATHER RESISTANCE OF PORCELAIN ENAMELS. EFFECT OF EXPOSURE SITE AND OTHER VARIABLES AFTER SEVEN YEARS.
Building Science Series.
by Margaret A. Rushmer, and Milton D. Burdick. 2 May 66, 22p BSS-4
Availability: (Type complete information as shown). Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.20.

Descriptors: (*Ceramic coatings, Environmental tests), Physical properties, Colors, Aluminum, Steel, Corrosion inhibition, pH, Humidity.

An exposure test of procelain enamels at seven representative sites in the continental United States was initiated by the National Bureau of Standards and the Porcelain Enamel Institute in 1956. After seven years all specimens were returned to the Bureau and the changes in gloss and color determined. These changes were found to be different al all exposure sites except Pittsburgh and New Orleans. The most severe changes occurred for specimens exposed at Kure Beach, 80 fee from the ocean, while the least change occurred for specimens exposed at Los Angeles. The differences in behavior of the specimens correlated with both the relative humidity and the pH of the suspended particulate matter at the different sites. A direct relation existed between the acid resistance of the enamels and weather resistance. However, enamels of different types, such as enamels on aluminum and steel, having the same acid resistance did not necessarily show the same weather resistance. Comparison with enamel specimens exposed for seven years in an earlier test showed that porcelain enamels produced after the end of World War II were equally resistant to changes in gloss at the Washington, D. C., site as those produced before the war. As a group, the regular glossy acid-resistant enamels on steel showed the best weather resistance of the various types tested. No corrosion of the base metal was noted for any specimen on which the initial coverage was complete. (Author)

AD-475 972 See Field 11D

AD-635 271 See Field 17B

AD-635 465 See Field 11H

PB-170 516 See Field 11G

11D. COMPOSITE MATERIALS

AD-475 972 **Field 11D, 11C**
CFSTI Prices: HC$2.60 MF$0.50
Naval Ordnance Lab., White Oak, Md. Non-Metallic Materials Div.
EVALUATION OF ARYLOXY ALKOXYSILANE GLASS FINISHES.
Progress rept. Jun 64-Jan 65.
by J. V. Duffy. 18 Nov 65, 24p
Proj. PR-4
NOLTR-65-137

Dexcriptors: (*Glass textiles, Finishes + finishing), (*Laminates, Flexural strength), (*Silanes, Finishes + finishing), Epoxy plastics, Laminated plastics, Coatings, Polyester plastics, Ethers.

Flexural strength data on laminates containing a series of new aryloxy alkoxysilanes is reported. Improvements in the dry, flexural strength of epoxy laminates were noted when integral blends containing the modified finishes were used. Solution application of aryloxy alkoxysilanes resulted in improved wet flexural strengths of epoxy laminates. Unsaturated aryloxy alkoxysilane finishes showed some improvements in both the dry and wet polyester laminate strengths. (Author)

N66-16588 **Field 11D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FRICTION AND WEAR CHARACTERISTICS OF POLYIMIDE AND FILLED POLYIMIDE COMPOSITIONS IN VACUUM (10-10 MM HG).
by D. H. Buckley. Feb 66, 13p NASA-TN-D-3261

Descriptors: *Polymer, *Wear, *Friction, *Lubrication.

For abstract, see T 66 16.

11E. FIBERS AND TEXTILES

AD-635 519 **Field 11E**
CFSTI Prices: HC$1.00 MF$0.50
Textile Research Inst., Princeton, N. J.
RESILIENCE OF FIBERS.
Final rept. 1 May 63-31 May 66.
by J. H. Dillon. 7 Jul 66, 12p
Contracts Nonr-4184 (00), Nonr-4184 (01)

Descriptors: (*Fibers, Physical properties), Molecular structure, Textiles.

For abstract, see T 66 16.

PB-170 390 **Field 11E, 5A**
CFSTI Prices: HC$4.00 MF$0.75
Pugh-Roberts Associates, Inc., Winchester, Mass.
ADVANCED SYSTEMS ANALYSIS OF TEXTILE INDUSTRY PROBLEMS.
Final rept.,
by L. Fillmore McPherson III, Alexander L. Pugh III, Edward B. Roberts, and Jarrod W. Wilcox.
1 Mar 66, 114p
Contract NBS-CST-1259

Descriptors: (*Textile industry, Systems engineering), (*Management engineering, Textile industry), Analysis, Fibers (Synthetic), Fibers (Natural), Economics.

The research effort leading to the results presented in this report endeavored to provide advanced systems treatment of a wide range of textile industry phenomena. Based on analysis of the identified systems, the key problems of many textile companies are seen as dependent on the companies' general inward-directed orientation instead of the more desirable, perhaps necessary, market-orientation. These orientations are reflected in the structure of a closed-loop feedback system that determines much of the industry's behavior. Not only does such a system conceptualization appear to explain structural problems of capacity cycles, for example, but more directly it extracts common innovation response ideas from several of the other defined systems.

PB-170 391 **Field 11E**
CFSTI Prices: HC$4.00 MF$0.75
Little (Arthur D.), Inc., Cambridge, Mass.
THE ENGINEERING PROPERTIES OF FIBERS.
by Apr 66, 129p Rept. no. C-66976
Contract CST-1238

Descriptors: (*Fibers, Mechanical properties), Physical properties, Tensile properties, Costs, Engineering, Tires.

The purpose of the manual is to express the mechanical and other properties of fibers in terms meaningful to structural, mechanical, and other engineers. Many materials reach their ultimate in tensile strength when in fiber form, and it is expected that an appreciation of this fact and the many other unique properties of fibers by engineers will result in broadening the use of fibers and textile structures in many industries.

AD-635 271 **See Field 17B**

11F. METALLURGY AND METALLOGRAPHY

AD-471 247 **Field 11F, 13H**
CFSTI Prices: HC$3.60 MF$0.50
Navy Marine Engineering Lab., Annapolis.
INVESTIGATION OF THE NOTCH SENSITIVITY OF NICKEL-COPPER-ALUMIUNM (K-MONEL) ROD.
Final rept. (Research and development),
by I. L. Caplan. Sep 65, 31p MEL-309-65
Proj. S-R007-09-02
Task 0857

Descriptors: (*Nickel alloys, Tensile properties), (*Rods, Notch sensitivity), Fastenings, Ductility, Mechanical properties, Brittleness, Rolling (Metallurgh), Copper alloys, Aluminum alloys, Aging (Materials), Cold working, Hot working, Extrusion, Drawing (Machine), Microstructure processing, Heat treatment.

Identifiers: K-Monel.

Tensile and notch tensile properties of K-monel processed by different fabrication techniques were investigated. Material processed by standard hot rolling and cold drawing was found to meet the ductility and strength requirements of military specifications. A drastic (30%) final cold reduction, followed directly by aging, lowered the percent of elongation below requirements of military specifications, but did not lead to weakness or brittleness of notch specimens. Extruding of small ingots with insufficient reduction of area led to material with low strength and brittleness.

AD-634 813 **Field 11F, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
NEW CAPABILITIES OF SPECTRAL ANALYSIS OF METALS AND ALLOYS WITH THE USE OF PRELIMINARY BATCHING BY CONTACT SPARK DISCHARGE,
by K. V. Gudkova, K. I. Taganov, and Z. I. Shelpkova. 20 Jan 66, 12p FTD-TT-65-1483
TT-66-61587
Unedited rough draft trans of Trudy po Khimii i Khimicheskoi Tekhnologii (USSR) n1 p26-30 1963.

Descriptors: (*Spectroscopy, Sampling), (*Metals, Spectroscopy), (*Alloys, Spectroscopy), USSR, Photoelectric effect, Recording systems.

Photoelectric recording of the spectrum of small batching of substance has an advantage over photographic recording not only in the part of a significant shortening of the time of measurement of the spectral lines but in relationship to a significant increase in sensitivity. Thus, for example when working with samples containing sulphur for development on the spectrograph ISP-22 with glass optics of the sulphur line 5320.6 A it was necessary that each spectrum be obtained from six support electrodes with the products of transfer - 6-fold exposure was carried out for each spectrum; on the vacuum polychrometer one electrode was sufficient for the measurement of sulphur line intensity. Thus, small doses produced by contact-spark transfer ofa substance may be successfully measured during photoelectric recording of the spectrum on an ordinary apparatus both for analytic purposes and when solving problems of a research nature. (Author)

AD-634 827 **Field 11F, 13H**
CFSTI Prices: HC$6.00 MF$0.50
IIT Research Inst., Chicago, Ill. Technology Center.
VANADIUM ALLOY STUDIES.
Final rept. 1 Mar 65-31 May 66,
by F. C. Holtz. 29 Jun 66, 36p IITRI-B6042-5
Contract NOw-65-0427-f

Descriptors: (*Vanadium alloys, Mechanical properties), Niobium alloys, Tantalum alloys, Titanium alloys, Zirconium alloys, Additives, Silicon, Carbon, Sheets, Foils, Mechanical working, Forging, Rolling (Metallurgy), Heat treatment, Aging (Materials).

Alloys based on V-20Cb and V-Cb-Ta, enriched in Ti, Si, and C were fabricated by arc-melting, hammer forging, and cold rolling to sheet or foil; the silicon and carbon additives promoted age hardening. The V-20Cb-10Ti base alloys were highly fabricable and had density-corrected strengths up to 1,300,000-in. at -320F, 800,000-in. at 1200F, and 250,000-in. at 1800F. Somewhat reduced fabricability was noted for V-Cb-Ta base alloys which contained from 28 to 54% V. The tantalum-containing materials were nearly as strong as the V-Cb-Ti alloys up to 1200F, and they were much stronger in the 1800 to 2400F range. Density-corrected strengths were above 400,000-in. at 1800F, and 160,000-in. at 2200F. Improved workability but slightly reduced strengths (Density-corrected) were noted in V-Cb-Ta alloys as vanadium contents were raised. (Author)

AD-634 834 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
MECHANICAL PROPERTIES OF ALLOYS OF THE QUARTERNARY SYSTEM Nb-W-Mo-Zr AT TEMPERATURES OF 1000 - 1600 C,
by E. M. Savitskii, and A. M. Zakharov. 21 Jan 66, 22p FTD-TT-65-1471
TT-66-61594
Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Chernaya Metallurgiya, v8 n1 p104-9 1965.

Descriptors: (*Niobium alloys, Mechanical properties), USSR, Tungsten alloys, Molybdenum alloys, Zirconium alloys, High-temperature research, Hardness, Phase studies, Rupture.

For abstract, see T 66 16.

AD-635 081 **Field 11F**
CFSTI Prices: HC$4.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
AN INVESTIGATION OF THE INFLUENCE OF DEOXIDATION AND CHEMICAL COMPOSITION ON NOTCHED-BAR PROPERTIES OF SEMIKILLED SHIP STEEL.
Final rept. and progress rept.
by H. M. Banta, R. H. Frazier, and C. H. Lorig.
27 Jun 52, 103p PR-1
Contracts NObs-50020, NObs-53239
Proj. SR-110
SSC-49
Prepared in cooperation with NRC, Contract NObs-50148.

Descriptors: (*Steel, Notch toughness), Deoxidation, Ship plates, Chemical analysis, Transition temperature, Carbon alloys, Manganese alloys, Phosphorus alloys, Sulphur, Silicon alloys, Vanadium alloys, Impact tests, Tensile properties, Fracture (Mechanics), Toughness.

The data presented in this paper show that 200-pound semikilled laboratory heats can be made with ample reproducibility for use in studying the influence of chemical composition and deoxidation upon the transition-temperature characteristics

of ABS Class A and Class B plate steels. The transition temperature of steels of the Class A and Class B types was found to be progressively raised, and to an appreciable extent, by increasing the carbon phosphorus, and vanadium contents within the limits studied in this investigation. Limited data indicated that increased sulphur did not raise the transition temperature but possibly lowered it. In the range in which sulphur occurs in commercial steels, it would not be expected to have a significant effect. In order to establish definitely the effect of silicon content, more data are needed. The transition temperature was definitely lowered by increasing the manganese content in the range covered in this investigation. The transition temperature was also lowered by decreasing the finishing temperature of the hot-rolled plate, the effect being quite pronounced. (Author)

AD-635 082 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge, Mass.
BRITTLE FRACTURE OF MILD STEEL IN TENSION AT - 196 C.
Progress rept. no. 3.
by W. S. Owen, B. L. Averbach, and M. Cohen.
5 Nov 57, 40p
Contract NObs-65918, NObs-72046
Projs. NS-011-078, NS-731-036
SSC-109
See also AD-264 524.

Descriptors: (*Steel, *Fracture (Mechanics)), Cryogenics, Strain (Mechanics), Creep, Stresses, Loading (Mechanics), Brittleness.

The tensile fracture behavior of a mild steel at - 196 C was studied in some detail. With the aid of long thin strip specimens loaded at controlled crosshead speeds between 0.00089 and 0.16 in./min, the strain pattern and microscopic changes preceding fracture were observed, and the magnitude local strain was measured. Specimens heat-treated to alter the tendency toward brittle behavior, but maintaining ferrite-pearlite structures, were also examined. Under these conditions, all the Luder's bands display microcracks in some ferrite grains. However, the as-received and normalized specimens do not fracture at low yield stresses (slow loading speeds) during the spread of the Luder's bands. By raising the loading speed, a critical stress is reached when fracture occurs after a delay time. The formation of microcracks and fracture is always preceded by gross yielding. On further increasing the loading rate, the fracture stress rises along with the yield stress. Deductions from the dislocation pile-up theory of fracture in polycrystalline metals are not compatible with the experimental data. It is concluded that the microcrack model suggested by Low is more appropriate. Some observations on the creep occurring in Luder's bands during their propagation at - 196 C are included. (Author)

AD-635 087 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.50
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
LOW CYCLE FATIQUE CRACK PROPAGATION CHARACTERISTICS OF HIGH STRENGTH STEELS.
Technical research rept.,
by Carl M. Carman, and Jesse M. Katlin. Apr 66, 38p
Proj. DA-1C024401A328
FA-R-1806

Descriptors: (*Steel, *Fracture (Mechanics)), Fatigue (Mechanics), Maraging steel, Tool steel, Fractography, Life expectancy, Mathematical predication, Stresses.

Identifiers: Maraging steel 18Ni, Steel H-11, Steel D6AC.

The fatigue crack growth properties of various high strength steels, including the 250 and 300 grades of the 18Ni-Co-Mo maraging steel, H11 steel, and D6A steel, have been studied using a center-cracked specimen. Experiments were conducted by cycling either at a constant stress or at a constant value of the stress intensity parameter, K. Electron microfractographs taken along the path of fatigue crack extension in the 250 grade maraging steel showed the growth ring pattern characteristic of fatigue. Measurement of the growth ring spacings and knowledge of the crack length permit calculation of the rate of crack extension as a function of K. The rates of crack extension, as determined by fractography and actual measurement on the specimen, are in good agreement. A technique for calculating the cyclic life of structures involving a numerical integration of K as a function of crack length and stress was programmed for computer operation. This calculation allows for the change in slope of the K vs da/dN at higher values of cyclic K. The results of these calculations are compared with the life prediction made by simple mathematical integration of the fourth power relationship for an infinite plate. (Author)

AD-635 107 **Field 11F, 13J**
CFSTI Prices: HC$2.60 MF$0.50
Metallurgical Research and Development Co., Inc., Washington, D. C.
EVALUATION OF NOTCH SENSITIVITY OF MILD STEEL SHIP PLATE BY DIRECT EXPLOSION TEST.
Final rept.
by G. S. Mikhalapov. 15 Mar 51, 29p
Contracts NObs-50464, NObs-50148
Proj. SR-120
SSC-43

Descriptors: (*Ship plates, Notch sensitivity), (*Steel, Notch sensitivity), Welds, Fracture (Mechanics), Welding rods, Welding, Toughness.

An investigation was made to determine whether variation in welding procedure, primarily welding electrodes, had an appreciable effect on the notch sensitivity of the finished joint and whether this effect was comparable to that produced by a difference in the quality of the prime plate.

AD-635 108 **Field 11F, 13J**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley.
CAUSES OF CLEAVAGE FRACTURE IN SHIP PLATE, HIGH YIELD STRENGTH STRUCTURAL STEEL.
Final rept.
by A Boodberg, and E. R. Parker. 21 Sep 49, 92p
Contracts NObs-31222, NObs-34231
Proj. SR-92
SSC-28

Descriptors: (*Ship plates, Fracture (Mechanics)), (*Steel, *Fracture (Mechanics)), Transition temperature, Welds, Microstructure, Hardness, Brittleness, Stresses.

The primary objective of the investigation was to study the effect of variations in steel composition on the temperatures at which the mode of failure changed from ductile shear to brittle cleavage type. These transition temperatures were determined by means of tension tests on notched plates and welded structural assemblies. Three types of specimens were used, two simple notched specimens and one that provided restraint to plastic flow at a corner produced by welding together steel plates set along three mutually perpendicular planes. The specimens were tested in tension at various temperatures and at a low rate of strain in order to determine the transition temperatures of four different heats of high yield strength structural steels. Auxiliary tests were conducted by using a simple bend test to determine the effect of welding on the behavior of the steels. Results of the tests show that the four high yield strength structural steels used in this investigation, when tested in the form of restrained welded specimens, have transition temperatures that vary from -65F for one of the steels, to as high as -75F for one of the others. The tests of notched specimens showed transition temperatures for a particular steel that were approximately 50F lower than those indicated by tests of the large specimens. However, it was found that the steels are rated in the same order of transition temperatures by all three of the tests.

AD-635 109 **Field 11F, 13J**
CFSTI Prices: HC$4.60 MF$0.50
Massachusetts Inst. of Tech. Cambridge.
THE EFFECT OF CYCLIC STRESS ON THE TRANSITION TEMPERATURE OF STEEL.
Final rept.
by H. E. Jacques. 18 Jul 49, 44p
Contracts NObs-25391, NObs-34231
Proj. SR-101
SSC-31
Previously announced 26 Jan 50 as PB-98 409, Lcmi $2.50, ph $6.25.

Descriptors: (*Steel, *Fracture (Mechanics)), Ship plates, Stresses, Fatigue (Mechanics), Transition temperature, Impact tests, Deformation.

This report concerns an investigation to determine if prior fatigue would affect the transition temperature curves in impact of ship steels. Tests were made on two shipbuilding steels, B and W, the greater amount of work having been done on steel B. A combination fatigue-impact specimen was designed and used. This specimen was round with a circumferential notch and could be tested in impact by sawing off the tapered ends necessary for holding in the fatique machine. As testing proceeded, it was found that fatigue cracks were developing at the base of the notch both above and below the endurance limit. When speciments were cyclically stressed so as to avoid fatigue cracks, the resulting transition curve showed little deviation from the original curve presumably due to the low stress of the prior fatigue. A series of specimens of steel B were prestrained in tension prior to testing in impact with a marked shift of the transition curve resulting. (Author)

AD-635 149 **Field 11F, 13J**
CFSTI Prices: HC$4.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
METALLURGICAL QUALITY OF STEELS USED FOR HULL CONSTRUCTION.
Progress rept.
by C. E. Sims, H. M. Banta, and A. L. Walters.
17 Nov 47, 84p
Contracts NObs-31219, NObs-34231
Proj. SR-87
SSC-13
Previously announced 23 Jun 48 as PB-86 270, Lcmi $3.00 ph $9.00. See also AD-635 182.

Descriptors: (*Steel, *Ship plates), Welds, Ship hulls, Chemical analysis, Fracture (Mechanics), Mechanical properties, Notch sensitivity, Tensile properties, Notch toughness, Carbon alloys, Manganese alloys, Silicon alloys, Molybdenum alloys, Vanadium alloys, Aluminum alloys.

To obtain definite information concerning the relationships among chemical composition, underbead weld cracking, and the mechanical properties, especially the tensile and notched-bar impact characteristics, a series of 30 laboratory heats was made and studied in the hot-rolled state to determine the individual influence of each of the following constituents when varied over a range sufficiently broad to definitely establish the trend of the effect; carbon, manganese, silicon, molybdenum, vanadium, and aluminum. For a standard chemical composition, a typical HTS analysis was selected, and the elements studied were then varied one at a time in this standard composition.

AD-635 172 **Field 11F, 13J**
CFSTI Prices: HC$4.00 MF$1.00
Swarthmore Coll. Pa.
TWELVE INCH FLAT PLATE TESTS.
Progress rept.
by Samuel T. Carpenter, Wendell P. Roop, Norris

Barr, Ewald Kasten, and Adolph Zell. 15 Apr 49, 121p
Contracts NObs-45521, NObs-34231
Proj. SR-98
SSC-21

Descriptors: (*Steel, Fracture (Mechanics)), (*Fracture (Mechanics), Metal plates), Loading (Mechanics), Transition temperature, Experimental data, Ship plates.

The report contains an account of the testing of the 'A', 'C', 'Bn', 'Br', 'Du' and 'E' steels. The tests described are tension tests run at various temperatures on specimens 24in long, 12in wide and 3/4in thick having a central internal notch one-quarter of the width of the plate with ends of the notch 0.010 inch wide made by a jeweler's hacksaw. The load was applied in the direction of the rolling. This program was undertaken because it was believed that tests made under standardized conditions would furnish additional information regarding the behavior of these steels, and would provide a standard that could be used to judge the efficacy of tests of small sized specimens adapted for use as acceptance tests. The report contains tables giving the load at first visible crack, at maximum load, and at ultimate load, together with the energies computed to those loads. Load-elongation curves for each specimen tested are included, together with diagrams showing maximum load, plotted with temperatures as abscissas, and diagrams showing energy to maximum load plotted with temperatures as abscissas. The transition temperature zones of these steels based on the 12in wide plate tests are reported based on energy considerations and on the mode of the fracture. (Author)

AD-635 180 **Field 11F, 20L**
CFSTI Prices: HC$6.00 MF$0.75
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
PLANE STRAIN FRACTURE TOUGHNESS AND MECHANICAL PROPERTIES OF 5A1-2.5Sn ELI TITANIUM AT ROOM AND CRYOGENIC TEMPERATURES.
Final rept.
by Carl M. Carman, John W. Forney, and Jesse M. Katlin. Apr 66, 64p
FA-R-1796, NASA-CR-54296

Descriptors: (*Titanium alloys, *Fracture (Mechanics)), (*Cryogenics, Titanium alloys), Metal plates, Toughness, Tensile properties, Aluminum alloys, Tin alloys, Propellant tanks, Creep, Hardening, Microstructure.

Identifiers: Fracture toughness, Titanium alloy Al 2.5Sn.

The suitability of 5Al-2.5Sn ELI titanium alloy for cryogenic tankage applications was studied by determining the mechanical and fracture properties of the material at testing temperatures ranging from room temperature to -423F. Small round tensile specimens were developed to measure the tensile properties over the range of testing temperatures. Plane strain fracture toughness measurements were also made at these temperatures using the 'pop-in' technique with a small notched bend specimen. Special laboratory techniques were developed to test the specimens at -423F, utilizing the specific heat of vaporization of liquid helium. The degree of preferred orientation in this alloy was qualitatively studied by determining the ratio of the width strain to the thickness strain. The fracture toughness values were interpreted in terms of the crystallography and mechanism of deformation of titanium. The data are summarized in terms of a part-through defect which will be stable at various operating temperatures and stress levels. It has been shown that texture hardening may be used to obtain high burst stresses under biaxial stress conditions. (Author)

AD-635 182 **Field 11F, 13J**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
METALLURGICAL QUALITY OF STEELS USED FOR HULL CONSTRUCTION.
Final summary rept.
by C. E. Sims, H. M. Banta, and A. L. Walters.
5 May 47, 62p
Contracts NObs-31219, NObs-34231
Proj. SR-87
SSC-11 PB-79 553
See also AD-635 149.

Descriptors: (*Steel, *Ship plates), Ship hulls, Tensile properties, Fracture (Mechanics), Welds, Heat treatment, Microstructure, Notch sensitivity.

This report discusses some of the pertinent factors, especially banding and homogenization, which influence the susceptibility of HTS hull steel to underbead weld cracking. The use of laboratory heats for evaluating various chemical compositions and deoxidation protices is considered. The specific items covered are as follows: (1) The influence of time and temperature upon the homogenization of both average and high chemical composition HTS steels. (2) The effect of various degrees of homogenization upon underbead cracking and tensile properties. (3) The effect of hot reduction upon the response to homogenizing treatments. (4) The demonstration of the mechanism of banding in HTS hull steels. (5) A study of the underbead cracking characteristics of quenched and drawn HTS having a yield strength above 75,000 p.s.i. (6) A comparison of the underbead cracking characteristics and mechanical properties of laboratory and commercial HTS hull steels. (Author)

AD-635 249 **Field 11F, 13H**
CFSTI Prices: HC$1.50 MF$1.00
Arizona Univ., Tucson. Dept. of Metallurgical Engineering.
HARDENING MECHANISMS IN A COBALT-BASE SUPERALLOY.
Master's thesis.
by Charles S. Lee. 1966, 147p
Contract AF 33 (608)-1205

Descriptors: (*Cobalt alloys, *Hardening), Hardness, Heat treatment, Aging (Materials), Microstructure, Chromium alloys, Aluminum alloys, Tungsten alloys, Tantalum alloys, Dispersion hardening, Crystal lattice defects.

Identifiers: Cobalt alloy AR-213.

A study was made of the heat treatment response and hardening mechanism of an experimental cobalt-base superalloy, AR-213. Solution treatment temperatures in the range of 1800 to 2250 F and aging temperatures from 1200 to 1900 F were investigated. Selected aged specimens corresponding to the 2200 F solution treatment were intensively studied using optical and electron microscopy and x-ray techniques to determine the hardening mechanism. The results of the study show that a maximum aged hardness of R sub C 47 is obtainable. The hardening mechanism is the precipitation of CoAl from the supersaturated matrix at temperatures between 1400 and 1600 F. This precipitate overages relatively rapidly at temperatures above 1600 F. A tantalum-zirconium carbonitride was also present in the alloy in a surprisingly large amount. (Author)

AD-635 276 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ELECTROMETALLURGY OF NONFERROUS METALS (SELECTED ARTICLES).
14 Jan 66, 43p FTD-MT-65-193
TT-66-61687
Edited machine trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) n239 p39-56, 70-81 1964.

Descriptors: (*Refining (Metallurgy), Electrochemistry), Aluminum, Electrolytes, Reaction (Kinetics), Electrodes, Liquids, Metals, Salts, USSR.

Contents: Interaction of aluminum with cryolite-alumina melts, by M. M. Vetyukov; On theory of electrolytic refining of metals in melts with liquid electrodes, by Yu. V. Baymakov.

AD-635 278 **Field 11F, 13I**
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INFLUENCE OF ALLOYING OF COPPER ON SEIZING IN CAPABILITY TEMPERATURES RANGE 23-450C.
by A. P. Semenov. 12 Jan 66, 26p FTD-MT-65-28
TT-66-61688
Edited machine trans. of Akademiya Nauk SSSR. Institut Mashinovedeniya Trenie i Iznos v Mashinakh. Sbornik, n15 p227-53 1962.

Descriptors: (*Wear resistance, Copper alloys), (*Copper alloys, Friction), Aluminum alloys, Silicon alloys, Phosphorus alloys, Iron alloys, Antifriction bearings, Manganese alloys, Antimony alloys, Tin alloys, Zinc alloys, Deformation, Thermal joining.

To study more fully the influence of alloying on seizing capability and its connection with the mechanical properties of alloys, a study was made of a large number of copper alloys in the region of solid solutions. Seizing capability was determined according to joint plastic deformation of pairwise formed sheet samples by symmetrically slanted punches by the method described earlier. The deformation of seizing found thus (minimum depths of penetration of punches at which durable bonding of samples occurred) were, for determination of specific pressures of seizing, plotted on curves representing the dependence of magnitudes of deformation on pressures applied during deformation of the same samples by flat narrow punches. The results of the investigation confirm that, for alloys of copper, the dependence of seizing capability with the dissolution of alloying components on the change of crystal lattice parameter and that of seizing capability on temperature are important indices of antifriction properties of alloys. Probably, analogous dependences can also serve as leading principles for the evaluation and creation of antifriction alloys on the basis of other metals.

AD-635 288 **Field 11F**
CFSTI Prices: HC$6.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
THE EFFECT OF MINOR ALLOYING ADDITIONS ON THE SEA-WATER CORROSION BEHAVIOR OF ALUMINUM-BRONZE ALLOYS.
Research and development rept. (Final).
by Robert E. Maersch. Jun 66, 20p MEL-196/66
Proj. S-F020-01-02
Task 0725

Descriptors: (*Bronze, Alumium alloys), (*Corrosion, Bronze), Tin alloys, Nickel alloys, Arsenic alloys, Sea water, Corrosion inhibition, Microstructure, Liquid immersion tests, Eutectics, Copper alloys.

Some compositions of aluminum-bronze alloys suffer an insidious type of selective-phase attack in seawater. One proposed method to improve the corrosion behavior of these materials was the addition of minor alloying elements to promote the formation of microstructural constituents that are electrochemically compatible. Three experimental alloys, containing small amounts of tin, nickel and arsenic, respectively, were analyzed after seawater exposure. None of the minor alloying additions imparted significant improvement in corrosion behavior of the base alloy. (Author)

AD-635 300 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Materials Science.
THE INFLUENCE OF ALLOYING ELEMENTS ON THE CARBON ACTIVITY IN STEEL.

Final rept. 1 Jul 61-31 Dec 65.
by David A. Stevenson, and Richard R. Zupp. 31 Dec 65, 31p
Grant DA-ARO (D)-31-124-G102
Proj. DA-20014501B32D
AROD-3145:1

Descriptors: (*Steel, Carbon alloys), Carbon, Solid solutions, Vanadium alloys, Austenite, Phase studies, Iron alloys.

An experimental method to determine the C activity in various solid solutions was developed. Samples of the solid solutions and an Fe-C reference sample were equilibrated with respect to C content by annealing them in a H2 - CH4 gas mixture in a closed cell. The C content of each sample was determined, and the C activity was obtained from the C content of the reference sample and well established data for the dependence of C activity on C content in Fe-C alloys. The influence of vanadium on the activity of carbon in austenitic Fe-C-V alloys at 1000C was determined by this technique. A general semi-empirical correlation was developed to describe the dependence of the activity coefficient of C on the composition of ternary austenitic iron-base alloys containing interstitial carbon and a substitutional solute. The correlation is particularly useful in predicting the partitioning of C between various alloys. (Author)

AD-635 368 **Field 11F, 11K, 13H, 13A K**
CFSTI Prices: HC$1.00 MF$0.50
Naval Boiler and Turbine Lab., Philadelphia, Pa.
CORROSION BEHAVIOR OF 16% CHROMIUM - 1% NICKEL DESUPERHEATER ALLOY WHEN EXPOSED TO CHEMICAL DESCALANTS.
Final evaluation rept.
by H. Meyer, and J. A. McKelvey. 17 Jun 66, 25p
NBTL-A-596
Proj. SF020-02-03
Task 0614

Descriptors: (*Stainless steel, Corrosion inhibition), (*Boiler tubes, *Cleaning compounds), Chromium alloys, Nickel alloys, Corrosion-resistant alloys, Corrosion, Sulfamic acids, Citric acids, Thiourea, Naval research.

Identifiers: Stainless steel 16-1.

An investigation was made to develop a suitable descalant formulation to permit chemical cleaning of 16% Chromium - 1% Nickel (16-1 Croloy) desuperheaters, without deleterious effects. Based on bench studies, these elements can be descaled safely with the Boiler Scale Removing Compound (sulfamic acid, citric acid, diethylthiourea) containing an inhibitor supplement. In addition, this formulation may be used to descale boilers with the 16-1 Croloy desuperheaters intact. A full scale boiler cleaning operation should be initiated to confirm the successful bench scale findings. (Author)

AD-635 381 **Field 11F, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE EFFECTS OF THERMAL TREATMENTS ON THE MATERIAL DAMPING AND FATIGUE PROPERTIES OF 2024 ALUMINUM ALLOY.
Master's thesis.
by Charles E. Archie. Mar 66, 84p GAM/MECH/66A-2

Descriptors: (*Aluminium alloys, *Heat treatment), Aging (Materials), Damping, Fatigue (Mechanics), Resonant frequency, Crystal lattice defects, Moisture.

Identifiers: Aluminum alloy 2024.

A comparison is made of the fatigue life and internal damping of 2024 aluminum alloy, naturally aged and artifically aged. The naturally aged alloy exhibited the higher damping and longer fatigue life when tested at resonant conditions. The naturally aged material showed longer fatigue life at stresses above 16300 psi when tested in reversed bending. The only significant metallurgical difference observed was the increased vacancy concentration in the naturally aged alloy. Resonant fatigue tests conducted in vacuum environments resulted in greatly increased fatigue lives, compared with ambient conditions. It is postulated that moisture accelerates crack propagation in fatigue failures. (Author)

AD-635 466 **Field 11F, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Army Weapons Command, Rock Island, Ill. Research and Engineering Div.
INOCULATION OF NODULAR IRON WITH YTTRIUM SILICIDE NODULIZING AGENT.
Technical rept.
by Wade C. Wurtz. Apr 66, 20p
Proj. PEMA-56016
RIA-66-1190

Descriptors: (*Yttrium, Iron alloys), (*Iron alloys, Casting), (*Casting alloys, Additives), Yttrium compounds, Silicides, Tensile properties, Deformation Ductility, Nickel, Hardness, Melting.

Identifiers: Yttrium silicide.

Although pure metallic yttrium is an effective nodulizing agent for making nodular cast iron, it is too costly for use in production. In the present investigation tests were made using a commercially available yttrium silicide, in which the cost of yttrium is much lower than for the pure metal. Laboratory size induction heats of iron were treated with varying amounts of the silicide by introducing it into the metal stream as the molten iron was tapped out into a ladle. After a standard post-inoculation treatment test bar molds were poured. Satisfactory mechanical properties of 55,000 psi yield strength, 72,000 psi tensile strength and 18% elongation were obtained with silicide additions containing yttrium equal to 0.20% of the charge weight. Raising the tap-out temperature improved the tensile and yield strength but lowered the ductility. Nickel additions also increased strength and hardness at the expense of ductility. Yttrium, like magnesium, showed a tendency to fade or slowly lose its nodulizing effect as the iron is held in the molten condition after treatment. (Author)

AD-635 478 **Field 11F, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
DETERMINATION OF THE ISOTHERMAL TRANSFORMATION DIAGRAM FOR HIGH CARBON M-2 TOOL STEEL.
by L. M. Markowitz, and M. H. Richman. Jul 66, 14p Rept. no. E-32
Contract SD-86

Descriptors: (*Tool steel, Transformations), Metallography, Carbon alloys, Graphics, Transition temperature, Hardness, Heat treatment, Carbides, Austenite, Bainite, Microstructure, Phase studies.

The isothermal transformation diagram for high carbon M-2 tool steel was determined for material austenitized at 2200F for 1 hour. The austenitic grain size was identified as ASTM No. 9 and there was 21 volume percent of undissolved carbides at the austenitizing temperature. The diagram was double-nosed with little transformation occurring between 700 and 1150F. The curve representing the start of precipitation of proeutectoid carbides is included on the isothermal transformation diagram and the M sub s temperature was found to be 420F. (Author)

N66-15343 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.75
Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.
DEVELOPMENT OF DISPERSION STRENGTHENED TANTALUM BASE ALLOY.
Quarterly progress rept. no. 6, 20 Feb-19 May 65.
by R. W. Buckman Jr, and R. C. Goodspeed.
1965, 72p WANL-PR- (Q)-007
Contract NAS3-2542
NASA-CR-54658

Descriptors: *Metallurgy, *Spacecraft power supply, *Dispersion hardening, *Tantalum alloy.

For abstract, see T 66 16.

N66-15373 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
ADVANCED REFRACTORY ALLOY CORROSION LOOP PROGRAM.
Quarterly progress rept. no. 2, 15 Jul-15 Oct 65.
by R. W. Harrison. 1965, 31p
Contract NAS3-6474
NASA-CR-54845

Descriptors: *Refractory alloy, *Corrosion, *Loop.

N66-16420 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
INFLUENCE OF BORON ADDITIONS ON PHYSICAL AND MECHANICAL PROPERTIES OF ARC-MELTED TUNGSTEN AND TUNGSTEN -1 PERCENT TANTALUM ALLOY.
by W. D. Klopp, and P. L. Raffo. Feb 66, 22p
NASA-TN-D-3247

Descriptors: *Boron, *Mechanical property, *Physical property, *Tungsten alloy, *Arc melting.

N66-16551 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MECHANICAL PROPERTIES OF SOLID-SOLUTION AND CARBIDE-STRENGTHENED ARC-MELTED TUNGSTEN ALLOYS.
by W. D. Klopp, and P. L. Raffo. Feb 66, 37p
NASA-TN-D-3248

Descriptors: *Arc melting, *Solid solution, *Tungsten alloy, *Mechanical property.

N66-16556 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EXPERIMENTAL INVESTIGATION OF PARAMETERS AND MATERIALS FOR FRAGMENTING-TUBE ENERG -ABSORPTION PROCESS.
by J. R. Mc Gehee. Feb 66, 38p NASA-TN-D-3268

Descriptors: *Material testing, *Alloy, *Energy absorption, *Fracture mechanics, *Spacecraft landing.

PB-169 801 **Field 11F, 13J, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
INVESTIGATION OF THE NOTCH SENSITIVITY OF NICKEL-COPPER-ALUMINUM (K-MONEL) ROD,
by I. L. Caplan. Sep 65, 31p MEL-309/65
Proj. S-R007-09-02
Task 0857

Descriptors: (*Notch sensitivity, Rods), (*Nickel alloys, Notch sensitivity), (*Copper alloys, Notch sensitivity), (*Aluminum alloys, Notch sensitivity), Manufacturing methods, Rolling (Metallurgy), Drawing (Machine processing), Ductility, Aging (Materials), Cold working, Extrusion, Heat treatment, Dispersion hardening.

Identifiers: Monel K.

Tensile and notch tensile properties of K-monel processed by different fabrication techniques were investigated. Material processed by standard hot rolling and cold drawing was found to meet the ductility and strength requirements of military specifications. A drastic (30%) final cold reduction, followed directly by aging, lowered the percent of elongation below requirements of military specifications, but did not lead to weakness or brittleness of notched specimens. Extruding of small ingots with insufficient reduction of area led to material with low strength and brittleness. (Author)

RFP-679 **Field 11F, 18J**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
A DENSITY STUDY OF BERYLLIUM.
by V. R. Friebel, and G. A. Campbell. 21 Jan 66, 7p
Contract AT (29-1)-1106

Descriptors: (*Beryllium, Density), (*Reactor materials, Materials forming).

For abstract, see N 20 14.

AD-461 705 **See Field 13H**

AD-634 916 **See Field 13H**

AD-635 003 **See Field 20K**

AD-635 027 **See Field 13H**

AD-635 083 **See Field 13H**

AD-635 088 **See Field 18H**

AD-635 148 **See Field 13J**

AD-635 171 **See Field 13E**

AD-635 181 **See Field 13E**

AD-635 271 **See Field 17B**

AD-635 469 **See Field 7D**

AD-635 482 **See Field 19D**

IDO-17145 **See Field 18I**

IDO-28653 **See Field 18I**

NBS-TN-286 **See Field 14B**

NLCO-971 **See Field 18D**

ORNL-3949 **See Field 20B**

USBM-RC-1232 **See Field 18J**

11G. MISCELLANEOUS MATERIALS

AD-634 782 **Field 11G, 7C**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
THERMAL STABILITY OF ORGANIC COMPOUNDS BY THE ISOTENISCOPE METHOD.
Summary rept., Dec 61-Jan 65,
by George Baum, and Frank Short. May 66, 33p
AFML-TR-65-347
Proj. AF-7340
Task 734004
Prepared in cooperation with Monsanto Research Corp., Dayton, Ohio.

Descriptors: (*Organic materials, *Thermal stability), Test methods, Vapor pressure, Pyrolysis, Aromatic compounds, Amines, Azines, Phosphonitrile chlorides, N-heterocyclic compounds, O-heterocyclic compounds, Halogenated hydrocarbons, Fluorine compounds, Silanes, Molecular structure.

Identifiers: Fluoro benzenes, Fluoro oxetanes, Isoteniscopic analysis, Fluoro triazines, Silylamines.

The thermal stability of some 45 different organic compounds was determined by the isoteniscope method. A mechanistic interpretation of the data is used to discuss structure-stability relationships. Compounds which appear to possess a high degree of thermal stability are the fluorooxetanes, arylsilylamines, fluoroalkyltriazines and fluoroaromatic compounds. (Author)

AD-635 223 **Field 11G**
CFSTI Prices: HC$6.00 MF$0.50
Coating and Chemical Co., Aberdeen Proving Ground, Md.
PRELIMINARY INVESTIGATION OF THE TEMPERATURE-FLOW-CORROSION UNIT AS A TOOL FOR COOLANT EVALUATION.
Progress rept.
by James H. Conley. Jun 66, 18p CCL-205
Proj. DA-1C024401A109

Descriptors: (*Freezing point depressants, Tests), Test equipment, Corrosion, Temperature, Electronic equipment, Reliability.

Identifiers: Evaluation.

The object of the study was to make a preliminary investigation of the Temperature-Flow-Corrosion Unit as a tool for the laboratory testing of automotive coolants. Nine 500 hour tests were conducted using antifreeze meeting Federal Specification 0-A-548a with and without added inhibitors. Results correlating those received in simulated service and glassware bench tests were obtained in three instances. Mechanical failure and improper functioning of electronic instruments minimized the use of values received in the other six tests. Results of the study indicate that the Temperature-Flow-Corrosion Unit has the capability of properly evaluating coolants and will serve as a valuable research tool in heat transfer studies. (Author)

AD-635 224 **Field 11G**
CFSTI Prices: HC$3.00 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
INVESTIGATION OF ORGANIC PHOSPHATES AS CORROSION INHIBITORS FOR COOLANTS.
Progress rept.
by James H. Conley. Jun 66, 22p CCL-206
Proj. DA-1C024401A109

Descriptors: (*Coolants, *Corrosion inhibition), (*Organic phosphorus compounds, Corrosion inhibition), (*Freezing point depressants, Corrosion inhibition), Phosphates, Tests, Sodium compounds, Borates, Thiazoles, Effectiveness.

The object of the study was to investigate the use of organic phosphates as corrosion inhibitors in coolant formulations. Glassware bench corrosion tests and simulated service tests were conducted on various organic acid phosphates in combination with other inhibitors such as sodium tetraborate (borax), sodium metaborate and sodium mercaptobenzothiazole (NACAP). Test data showed that these phosphates when exposed to hard water form non-crystalline precipitates that offer no deleterious effect to cooling systems. Test data also showed that these phosphates are effective corrosion inhibitors when used with a sodium borate buffer. (Author)

PB-170 516 **Field 11G, 11C, 11B**
CFSTI Prices: HC$5.00 MF$1.00
Wyoming Univ., Laramie. Natural Resources Research Inst.
COAL HYDROGENATION STUDY.
Final rept.,
by Howard F. Silver, Burl E. Davis, and Walter E. Duncan Jun 65, 152p

Descriptors: (*Coal, Hydrogenation), (*Cements, Bituminous coatings), (*Bituminous coatings, Cements), Roads, Tars, Asphalt, Viscosity, Distillation, Gas analysis, Binders.

The report is the record of one year of research on efforts to produce a bituminous cement by the hydrogenation of coal. The complete results of 26 hydrogenation experiments are given along with the development of the laboratory procedures necessary to follow the effects of changing hydrogenation reactor conditions and to evaluate the resulting bitumen-like product. The hydrogenation conditions used in most of the runs to date have been quite severe and the production of gaseous by-products has been high. The effect of operating conditions on the product properties is not yet clearly defined. The effects of carrier properties and operating conditions appear to be interrelated: one may adjust operating conditions to overcome the disadvantages of a specific carrier and vice versa. The ultimate product is, as yet, ill-defined. The better bitumens produced to date are comparable in many ways to asphalts and road tars. Most of the bitumens have a higher viscosity temperature susceptibility than asphalts, with susceptibility being in the range of, or lower than, road tars. Some have had a lower retained viscosity than asphalts indicating improved aging performance. (Author)

AD-462 001 **See Field 5A**

AD-490 833 **See Field 22B**

AD-635 142 **See Field 7E**

AD-635 271 **See Field 17B**

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-634 791 **Field 11H**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
MOLYBDENUM DISULFIDE-BASE SOLID LUBRICANTS.
ATD work assignment no. 88,
by Z. S. Rubtsova, and L. N. Sentyurikhina.11 May 66, 11p ATD-66-52
TT-66-61654
Trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) n11 p41-5 1965. Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Lubricants, Solids), Films, Temperature, Life expectancy, USSR, Molybdenum compounds, Sulfides.

Identifiers: Molybdenum disulfide, Dry-film lubricants.

It was shown that in air at room temperature and at high temperatures VNII NP-212 and VNII NP-230 solid film lubricants with organic film forming materials have the longest life. In a vacuum of 0.00001 torr and in argon, the limit of working temperatures for solid film lubricants VNII NP-209, VNII NP-213, and VNII NP-229 is increased to 500-600C. It was shown that for all practical purposes, exposure to low temperatures (-254C) and radiation with an integrated dose of 10 to the 8th power--10 to the 9th power rad do not shorten the life of solid film lubricants. (Author)

AD-635 078 **Field 11H**
CFSTI Prices: HC$4.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif.
LUBRICATION EVALUATION.
by Francis J. Clauss. Apr 66, 116p

Descriptors: (*Lubricants, Performance (Engineering)), Analysis, Oils, Films, Greases, Spacecraft, Halocarbon plastics, Ball bearings, Friction, Adhesion, Welding.

Identifiers: Evaluation, Solid film lubrication.

The report summarizes an evaluation of lubricants for spacecraft applications. Section 1 presents information on the performance of various oils, greases, bonded solid film lubricants (e.g., molybdenum disulfide), and special self-lubricating retainer materials (e.g., reinforced Teflon) on instrument-size ball bearings operating in simulated space conditions of vacuum, temperature, and radiation. Section 2 presents information on the performance of various bonded solid film lubricants under simple sliding conditions in air. Appendix A discusses the friction and adhesion of metals, with particular emphasis on cold welding. Appendix B is a code identifying the proprietary lubricants tested.

AD-635 222 **Field 11H**
CFSTI Prices: HC$4.00 MF$0.50
Coating and Chemical Co., Aberdeen Proving Ground, Md.
PEROXIDE CATALYZED DECOMPOSITION OF HYDRAULIC BRAKE FLUIDS AS RELATED TO THE OXIDATION STABILITY TEST AND SHELF STORAGE.
Interim rept.
by Jules B. Counts. Jun 66, 21p CCL-203, IR-1

Descriptors: (*Hydraulic fluids, Decomposition), Aromatic compounds, Peroxides, Catalysis, Hydraulic brakes, Storage, Oxidation, Stability, Tests.

Identifiers: Benzoyl peroxides.

The report contains the findings of the investigation of the benzoyl peroxide decomposition of brake fluids and the decomposition in warehouse storage.

AD-635 465 **Field 11H, 13H, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Army Weapons Command, Rock Island, Ill. Research and Engineering Div.
STATIC OUTDOOR EXPOSURE TESTS ON SOLID FILM LUBRICANT COATINGS.
Technical rept.
by G. P. Murphy, and F. S. Meade. May 66, 24p
Proj. DA-1C024401A107
RIA-66-1546

Descriptors: (*Lubricants, *Corrosion inhibition), Coatings, Solids, Films, Environmental tests, Substrates, Alloys, Phosphate coatings, Thickness, Phenolic plastics, Graphite, Molybdenum compounds, Sulfides, Antimony compounds, Oxides, Lead compounds, Phosphites.

An investigation was made to: (1) determine the affect of several Rock Island Arsenal solid film lubricant formulations on the corrosion protection provided by several metal substrates and (2) determine the optimum solid film lubricant-substrate combination providing greatest corrosion protection. Conclusions obtained from the first series of tests are: (1) the solid film lubricant coating containing graphite decreased the corrosion protection provided by all the substrates and (2) the other solid film lubricant coating increased the corrosion protection provided by the zinc phosphatized substrate but did not substantially improve the corrosion protection provided by the other substrates. The limited exposure period to date of the second series of tests produced the following conclusions: (1) one solid film lubricant formulation greatly increased the corrosion protection provided by zinc phosphatized steel, (2) no corrosion has occurred on the remaining substrates coated with this formulation and (3) increasing the lubricant film thickness greatly increases the corrosion protection provided by the lubricant.

11I. PLASTICS

AD-634 982 **Field 11I, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SYNTHESIS OF NOVOLAC EPOXY RESINS,
by Erwin A. Hoess, and William C. Tanner. Jul 66, 25p
PA-TR-3293

Descriptors: (*Phenolic plastics, *Synthesis (Chemistry)), (*Adhesives, Epoxy plastics), (*Epoxy plastics, Phenolic plastics), Polymers, Molecular weight, Formaldehyde, Catalysts, Chlorine, Condensation reactions, Phenols.

Novolac resins were prepared from p-chlorophenol using a variety of sources for methylene bridges. Alkaline and acidic catalysts were used to promote condensations; however, the products obtained were not always true novolacs in that polyhydroxybenzyl ethers and polyhydroxybenzylamines were isolated. Molecular weights varied from that of the 'dimer' to 1500 for the true novolacs and as high as 1975 for the polyhydroxybenzyl ethers. Dechlorination of the various resin species was successful. Polyglycidyl ethers (epoxy resins) were formed from several species of the resins. (Author)

AD-635 121 **Field 11I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., White Oak, Md. Non-Metallic Materials Div.
THE COMPRESSIBILITY OF POLYMERS TO 20,000 ATMOSPHERES.
Interim rept.,
by R. W. Warfield. 1 Jun 66, 35p
NOLTR-66-45
See also AD-460 483.

Descriptors: (*High-pressure research, Polymers), (*Polymers, Compressive properties), (*Plastics, Compressive properties), Phase studies, Crosslinking (Chemistry), Acrylic resins, Styrene plastics, Nylon, Polyethylene plastics, Epoxy plastics, Polyester plastics, Halocarbon plastics.

Bulk compressibilities of a series of linear and crosslinked polymers have been measured at pressures up to 20,000 atmospheres and over the temperature range 22 to 200C. These polymers exhibited non-linear compressibility characteristics reaching a maximum magnitude of the compressibility of about 20% at 20,000 atmospheres. In this report the nature of the observed compressibilities are discussed and glass-rubber phase diagrams are given for several systems. It is shown that the compressibility of polystyrene is time dependent. (Author)

N66-16066 **Field 11I**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
OUTGASSING RATES IN POLYMERIC FOAMS.
by E. F. Cuddihy, and J. Moacanin. 15 Dec 65, 20p JPL-TR-32-840
Contract NAS7-100
NASA-CR-69727

Descriptors: *Carbon dioxide, *Diffusion coefficient, *Gaseous diffusion, *High vacuum, *Polyurethane foam.

For abstract, see T 66 16.

PB-170 344 **Field 11I, 5C**
CFSTI Prices: HC$4.00 MF$0.75
Fry Consultants, Inc., Frankfurt am Main (West Germany).
THE WEST GERMAN PLASTICS MARKET. RAW MATERIALS. FINISHED PRODUCTS. MACHINERY.
24 Dec 65, 111p
Prepared in cooperation with Business and Defense Services Administration, Department of Commerce, Washington, D. C. Prepared for presentation at Plastics U.S.A. Exhibition, Frankfurt Trade Center, May 4-11, 1966.

Descriptors: (*Plastics, Commerce), (*West Germany, Commerce), Materials, Machines, Processing, United States.

Recommendations: The findings indicate that the most effective emphasis for the Trade Center show would be on plastics raw materials, with a secondary emphasis on specialized types of machinery and accessories. The advantages of particular U. S. plastics raw materials can best be shown in connection with the specific product application in which it is used. It would be advisable that the finished product that is normally made from the plastic raw material be shown at the exhibit. Second, since the main advantage that U. S. companies have in this field is technical know-how, products would have to be demonstrated by competent and experienced specialists and technical engineers. The exhibition of processing machinery is most likely to be successful if built around operating units. (Author)

AD-635 271 **See Field 17B**

PB-170 496 **See Field 13B**

11J. RUBBERS

AD-634 804 **Field 11J**
CFSTI Prices: HC$1.00 MF$0.50
Frick Chemical Lab., Princeton Univ., N. J.
THERMAL STABILITY OF ELASTOMERIC NETWORKS AT HIGH TEMPERATURES (WITH ADDENDUM ON SiB-2 PROPERTIES).
Technical rept.,
by T. C. P. Lee, Leslie H. Sperling, and Arthur V. Tobolsky. Jun 66, 17p
Contract Nonr-1858 (07)
Proj. NR-356-377
ONR-RLT-93

Descriptors: (*Elastomers, Thermal stability), (*Silicone plastics, Thermal stability), (*Polyethylene plastics, Thermal stability), Stresses, Relaxation time, Nitrogen, Heat of activation, Siloxanes, High-temperature research.

Identifiers: Ethylene-propylene terpolymers, Polydimethylsiloxanes.

Using a dry nitrogen atmosphere, stress relaxation experiments were carried out on poly (dimethyl siloxane) and an ethylene-propylene terpolymer. Relaxation times much longer than expected were observed, and plots of ln f (t)/f (O) vs time were linear in all cases. (Author)

AD-635 114 **Field 11J**
CFSTI Prices: HC$1.00 MF$0.50
Clothing and Organic Materials Div., Army Natick Labs., Mass.
RESEARCH COMPOUNDING OF NITROSO RUBBER TERPOLYMERS.
Technical rept.
by Charles B. Griffis, and Charles W. Shurtleff.
May 66, 21p C/OM-21
Proj. LC024401A329
USA-NLABS-Tr-66-42-CM

Descriptors: (*Synthetic rubber, Synthesis (Chemistry)), (*Organic nitrogen compounds, Synthetic rubber), Polymerization, Processing, Aromatic compounds, Bromine compounds, Chlorine compounds, Fluorine compounds, Hydrogen compounds, Dienes, Esters, Peroxides, Crosslinking (Chemistry), Transition temperature, Differential thermal analysis, Low-temperature research, Polymers.

Identifiers: Nitroso rubber.

Terpolymers were synthesized to give nitroso rubbers having improved processing characteristics and improved low-temperature properties. The terpolymers fall into six types: aromatic-containing, bromine- or chlorine-containing, hydrogen-containing, diene-containing, ester-containing, and miscellaneous. Processing studies were conducted based on the reactive chemical sites contained in the terpolymer. Low-temperature property studies were confined to differential thermal analysis determinations of the second-order transition, Tg, temperatures. The best processing results were obtained with dichlorobenzoyl peroxide crosslinked esters. The low-temperature properties of the terpolymers show promise for an improved processible nitroso rubber. (Author)

AD-466 040 **See Field 21I**

11K. SOLVENTS, CLEANERS, AND ABRASIVES

AD-635 073 **Field 11K**
CFSTI Prices: HC$1.00 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DIMENSIONAL ANALYSIS OF BIODEGRADABLE SURFACTANT-SOIL SYSTEMS.
Progress rept.
by A. Mankowich. Jun 66, 22p CCL-202
Proj. DA-1C024401A329

Descriptors: (*Cleaning compounds, Effectiveness), Soils, Removal, Solubility, Analysis, Alcohols, Phenols, Degradation, Surface-active substances, Measurement.

Identifiers: Biodegradable detergents.

Previous work with hard surfactants on the application of dimensional analysis to detergency correlation is further validated by the physiocochemical and soil removal data of systems in which the surfactants were biodegradable, commercial nonionics of the ethoxylated alkylphenol, primary alcohol, and secondary alcohol types. The fact that only eleven soil-surfactant systems gave 90-100% soil removals of the forty-two studied is attributed to the relatively low ethylene oxide (EO) mol ratios of the surfactants. It is postulated that the intrinsic detergency of the surfactants at 180F. is related to (EO) content (higher HLB and/or increased solubility). (Author)

AD-635 368 **See Field 11F**

11L. WOOD AND PAPER PRODUCTS

PB-170 354 **Field 11L, 20K, 2F**
CFSTI Prices: HC$4.00 MF$0.50
Forest Products Lab., Madison, Wis.
STRESS DISTRIBUTION IN AN ORTHOTROPIC HALF-PLANE SUBJECTED TO A CONCENTRATED LOAD.
Research paper.
by A. C. Maki. Feb 66, 12p FPL-54

Descriptors: (*Wood, Stresses), (*Stresses, Wood), Loading (Mechanics), Wedges.

Mathematical expressions are derived for the stress distribution in wood subjected to a concentrated load. The orthotropic nature of wood was taken into account in the derivation. The analysis was also used to determine the stress distribution in an orthotropic wedge subjected to a concentrated load at its vertex. (Author)

PB-170 356 **Field 11L, 2F**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
STRENGTH AND RELATED PROPERTIES OF A RANDOMLY SELECTED SAMPLE OF SECOND-GROWTH REDWOOD.
Research paper.
by B. A. Bendtsen. Feb 66, 19p FPL-53

Descriptors: (*Wood, Mechanical properties), Density, Structural properties, Deformation, Flexural strength, Failure (Mechanics).

Identifiers: Redwood.

Most mechanical properties were found to be 20 to 25 percent lower than those of virgin material. Exceptions to this were maximum shearing strength parallel to grain and maximum tensile strength parallel to grain. The mechanical properties were generally substantially higher than previously reported for open-grown second-growth material but comparable to the properties of close-grown material. Important structural properties such as modulus of elasticity and modulus of rupture in bending, maximum crushing strength parallel to grain, and maximum shearing strength were substantially higher than an average of close- and open-grown material previously evaluated. Although the average specific gravity was only approximately 10 percent lower than for virgin material, most strength properties are somewhat lower than those of virgin redwood of the same specific gravity. Shrinkage characteristics are comparable to those previously reported for virgin and second-growth redwood. (Author)

PB-170 357 **Field 11L, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Labs., Madison, Wis.
SOME MACHINING PROPERTIES OF TWO WOOD SPECIES GROWN IN HAWAII-MOLUCCA ABIZZIA AND NEPAL ALDER.
Research note.
by C. C. Peters, and J. F. Lutz. Feb 66, 20p FPL-0117

Descriptors: (*Machining, Wood), (*Wood, Hawaii), Structural properties, Classification.

The results of planing, shaping turning, boring, and mortising tests on specimens of molucca albizzia and nepal alder, grown in Hawaii, are presented and their machining properties are compared with those of several hardwoods of about the same specific gravity. (Author)

PB-170 358 **Field 11L, 13A, 2F**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
NEWS AND VIEWS OF THIS KILN-DRYING BUSINESS: OPERATION AND MAINTENANCE OF LUMBER DRY DILNS.
Research note.
Feb 66, 13p FPL-0118

Descriptors: (*Wood, Driers (Appratus)), (*Driers (Apparatus), Wood), Operation, Maintenance.

For abstract, see T 66 16.

PB-170 359 **Field 11L, 2F**
CFSTI Prices: HC$1.00 MF$0.50
Forest Products Lab., Madison, Wis.
FRAMEWORK OF QUALITATIVE RELATIONSHIPS IN WOOD UTILIZATION.
Research paper.
by George H. Englerth. Jan 66, 18p FPL-45

Descriptors: (*Wood, Performance (Engineering)), Physical properties, Classification, Quality control, Forestry, Processing, Trees.

Provides a guide to evaluate the technical aspects of timber quality. Tree and wood characteristics are discussed in relationship to end use and processing requirements, and the role that environment, silviculture, biological agents, harvesting, and processing exert on these characteristics. (Author)

PB-170 398 **Field 11L**
CFSTI Prices: HC$2.00 MF$0.50
Forest Products Lab., Madison, Wis.
EFFECT OF SIZE ON BENDING STRENGTH OF WOOD MEMBERS,
by Billy Bohannan. May 66, 34p Research paper FPL-56

Descriptors: (*Wood, Bending), Physical properties, Beams (Structural), Rupture, Statistical analysis, Loading (Mechanics).

Identifiers: Size.

A size-strength relationship for the bending strength of wood beams was developed usinag a statistical theory of strength of materials. Results show that the modulus of rupture is dependent upon the length and depth of the beam and upon the method of loading, but is independent of beam width. Theoretical results compare favorably with observed data from clear, straight-grained, Douglas-fir beams having sizes ranging from 1 inch deep by 14 inches long to 31-1/2 inches deep by 48 feet long. (Author)

AD-635 271 **See Field 17B**

PB-170 292 **See Field 5C**

12A. MATHEMATICS AND STATISTICS

AD-437 802 **Field 12A, 17G**
CFSTI Price: HC$1.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
AN OPERATOR THEORETIC FORMULATION OF LINEAR DIFFERENTIAL SYSTEMS.
by W. A. Porter. Apr 64, 13p Rept. no. 2900-458-R
Contracts DA-36-039-sc-78801, AF-33 (657)-11501
Proj. DA-3D5801001
Memo. of Proj. Michigan.

Descriptors: (*Control systems, Differential equations), (*Differential equations, Control systems), Operators (Mathematics), Transformations (Mathematics), Navigation, Theory, Topology.

The linear differential system, x (t) = A (t)x (t) + B (t)u (t) + x (t sub 0) = x to the zeroth power, is reduced to a canonical operator theoretic form. This representation consists of a parameterized family of bounded linear transformations into a cartesian product of the underlying scalar field. It gives immediate results for the minimum energy control problem. (Author)

AD-634 800 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
APPLICATION OF CONSENSUS THEORY TO THE MINIMIZATION OF BOOLEAN FUNCTIONS.
Research rept.,
by Pierre Tison. Jun 66, 43p PIBMRI-1330-66
Contract AF 49 (638)-1402
Proj. AF-4751

Descriptors: (*Special functions (Mathematical), Theory).

Given two implicants of a boolean function, we can by performing their consensus, find a third implicant. This operation has been used for finding the prime implicants of a boolean function. In this paper, the consensus is extended from two to any number of terms. A property of these generalized consensus relations leads to a systematic way of finding them. It is shown that any prime implicant of a boolean function is a generalized consensus, therefore the algorithm for the determination of the consensus relations can be used for finding the prime implicants. This new method is simpler than the usual process of iterative consensus. It is also shown in this paper that consensus theory can be

used for finding the minimal sums of a boolean function. The methods applicable for any boolean function, with or without don't care conditions, with a single or a multiple output. (Author)

AD-635 018 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Statistics.
THE MAXIMUM DEVIATION OF SAMPLE SPECTRAL DENSITIES.
Technical rept.
by Michael B. Woodroofe, and John W. Van Ness.
3 Jun 66, 30p TR-16
Contract Nonr-225 (52), Grant DA-ARO (D)-31-124-G726
Proj. NR-342-022
AROD-2025:17

Descriptors: (*Statistical analysis, *Sampling), Fourier analysis.

Identifiers: Time series analysis.

The maximum deviation of the sample spectral density from the true one is shown to be relatively stable for a wide class of linear processes. The result is first established for pure white noise processes. T general case is reduced to the case of pure white noise. (Author)

AD-635 021 **Field 12A**
CFSTI Prices: HC$4.00 MF$0.75
Columbia Univ., New York. Dept. of Mathematics.
COHOMOLOGIE NON ABELIENNE.
by Jean Giraud. 1966, 120p CU-21-Nonr-266 (57)-M
Contract Nonr-266 (57)
Text in French.

Descriptors: (*Algebraic topology, *Groups (Mathematics)), France.

For abstract, see T 66 16.

AD-635 049 **Field 12A, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Mitre Corp., Bedford, Mass.
NUMERICAL COMPARISON OF EXACT, UNIFORM, AND NON-UNIFORM ASYMPTOTIC SOLUTION OF THE REDUCED WAVE EQUATION NEAR A CAUSTIC.
by R. M. Lewis, and L. J. Kaplan. Jun 66, 26p MTR-32
Contract AF 19 (628)-5165
Proj. AF-4966
ESD-TR-66-66

Descriptors: (*Numerical analysis, *Partial differential equations), (*Electromagnetic waves, Diffraction), Asymptotic series, Geometry, Optics.

Identifiers: Wave equation.

A numerical comparison of the exact solution, the uniform asymptotic solution, and the non-uniform asymptotic solution of a field that produces a circular caustic is performed. It is seen that the uniform asymptotic solution is accurate even at the caustic for moderate values of ka. Curves and data are given as a function of Ka and distances from the caustic. The asymptotic expressions are derived both from the exact solution and from the physics of the circular caustic. (Author)

AD-635 099 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., Seattle. Dept. of Mathematics.
THE NON-INVARIANCE OF HYPERBOLICITY IN PARTIAL DIFFERENTIAL EQUATIONS.
Technical rept.
by H. H. Johnson. Jun 66, 22p TR-30
Contract Nonr-477 (15)
Proj. NR-043-186

Descriptors: (*Partial differential equations, Theory).

Hyperbolicity is shown to be not an absolute invariant in the sense defined in. Specifically, an example of a non-hyperbolic system is given with a partial prolongation which is hyperbolic. A large class of systems is found which is closed under modified absolute equivalence and which contains all hyperbolic systems. These ideas are applied to give existence theorems for the initial value problem in several types of non-hyperbolic systems. (Author)

AD-635 139 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Research Triangle Inst., Durham, N. C.
A GENERAL METHOD FOR THE CALCULATION OF AXIS-CROSSING MOMENTS.
Technical rept. no. 5.
by M. Ross Leadbetter. Jun 66, 14p SU-181
Contract Nonr-4565 (00)
Proj. NR-042-246

Descriptors: (*Stochastic processes, Theory).

In this report the moments of the number of crossings of a level or curve by a stochastic process are obtained, for a wide class of such processes. This extends results of Cramer and Leadbetter, also Ylvisaker to non normal cases and provides an alternative derivation to that of Ylvisaker (loc. cit.) in the normal case. (Author)

AD-635 144 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Dept. of Statistics.
A SOLUTION TO A COUNTABLE SYSTEM OF EQUATIONS ARISING IN MARKOVIAN DECISION PROCESSES.
Technical rept.
by Cyrus Derman, and Arthur F. Veinott Jr. 7 Jul 66, 14p TR-89
Contract Nonr-225 (53), Nonr-225 (77)
Projs. NR-042-002, NR-347-010

Descriptors: (*Dynamic programming, *Statistical processes), Decision theory.

A countable system of equations arising in Markovian decision processes is studied. Conditions are given ensuring the existence and uniqueness of an explicit solution to the system. (Author)

AD-635 154 **Field 12A, 20D**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
MOMENT METHODS IN RADIATIVE TRANSFER PROBLEMS.
Technical information series.
by M. P. Sherman. Jun 66, 42p Rept. no. R66SD30

Descriptors: (*Transport properties, Numerical analysis), Differential equations, Fluid mechanics, Boundary value problems.

Identifiers: Moment method, Radiative transfer.

Half of the equations obtained from the radiative transfer equation by use of any moment approximation are unstable. Small changes in choice of the unknown boundary values give rise to large changes in the solution. In this work the cause of this difficulty is isolated and the problem overcome. The techniques developed give new insight into the moment approximations. The complex boundary conditions derived by Krook (On the Solutions of the Equations of Transfer I, Astrophy J.122:1955) for the full moment approximations have a simple meaning in transformed variables. A comparison is made of the accuracy of full and half moment approximations using several examples. The first full moment (Eddington) approximation is found roughly comparable to the first half moment approximation, the second full moment to the second half moment approximation. (Author)

AD-635 191 **Field 12A, 20J**
CFSTI Prices: HC$3.00 MF$0.50
Michigan Univ., Ann Arbor. Dept. of Physics.
LOWERING AND RAISING OPERATORS FOR THE ORTHOGONAL GROUP IN A CANONICAL GROUP CHAIN WITH THE AID OF THEIR GRAPHS.
Technical rept.
by Sing Chin Pang, and K. T. Hecht. 31 May 66, 56p
Contract Nonr-1224 (59)

Descriptors: (*Operators (Mathematics), *Groups (Mathematics)), Matrix algebra, Graphics, Vector analysis, Quantum mechanics, N-body problem.

For abstract, see T 66 16.

AD-635 238 **Field 12A**
CFSTI Prices: HC$4.00 MF$0.50
Utah Univ., Salt Lake City. Dept. of Mathematics.
LIAPUNOV STABILITY FOR NONLINEAR DIFFERENTIAL EQUATIONS.
Master's thesis.
by Arlet Iris Boyer. Jun 66, 38p
Contract AF 33 (608)-1288

Descriptors: (*Nonlinear differential equations, Stability), Matrix algebra, Vector analysis, Special functions (Mathematical).

Identifiers: Theses, Lyapunov method.

For abstract, see T 66 16.

AD-635 247 **Field 12A**
CFSTI Prices: HC$4.00 MF$1.00
Texas A. and M. Univ., College Station.
SOLUTIONS OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS BY A LINEAR PROGRAMMING TECHNIQUE.
Master's thesis.
by James Franklin Ormand Jr. May 66, 179p
Contract AF 33 (608)-1284

Descriptors: (*Partial differential equations, *Linear programming), Boundary value problems, Numerical analysis, Feasibility studies.

Identifiers: Theses.

For abstract, see T 66 16.

AD-635 375 **Field 12A**
CFSTI Prices: HC$1.50 MF$0.50
Army Aeromedical Research Unit, Fort Rucker, Ala.
COMMENT ON CORRELATION COEFFICIENT USE.
by R. A. Avner. Jul 66, 8p USAARU-67-1
Proj. DA-3A0-2560-1A-819
Task 036

Descriptors: (*Statistical functions, Effectiveness), Correlation techniques.

In computing the Pearson r, observations are identified on a nominal scale. The values assigned these observations are measured on a ratio or interval scale. Confusion of these two facts has led to the mistaken assumption that the Pearson r can measure degree of association between nominally measured variables. (Author)

AD-635 446 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div of Applied Mathematics.
REDUCIBILITY OF MATRIX POLYNOMIALS AND THEIR TRACES.
Technical rept.
by John S. Lew. Apr 66, 12p TR-10
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Polynomials, *Matrix algebra), Invariance, Number theory.

For nxn matrices, we show the reducibility in degree of certain products of matrix variables and their traces, thus generalizing from two- and three-dimensional space some results used by Rivlin, Smith, and Spencer to get an orthogonal integrity basis for second-rank symmetric tensors. In particular we show the reducibility for $n > 3$ of any product of 2n-1 matrices and of its trace. (Author)

AD-635 451 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Copenhagen Univ. (Denmark). Inst. of Mathematical Statistics.
ASYMPTOTIC PROPERTIES OF BAYESIAN SINGLE SAMPLING PLANS.
Technical rept.
by A. Hald. May 66, 14p TR-10
Contract N62558-3073
Proj. NR-042-225

Descriptors: (*Sampling, *Decision theory), (*Asymptotic series, Sampling), Quality control, Denmark.

Identifiers: Bayes models.

The model considered is based on a differentiable prior distribution, a general loss function, an operating characteristic written as an Edgeworth expansion, and sampling costs expressible as a polynomial in the sample size. Asymptotic expressions for the Bayesian single sampling plan are derived and it is shown how previously known results may be found as special cases of the present one. The efficiency of non-optimum plans is discussed. (Author)

AD-635 531 **Field 12A, 5A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE MYTHOGRAPHY OF MILITARY R AND D.
by Robert L. Perry. May 66, 17p P-3356
Prepared for presentation at the National Meeting of the Operations Research Society of America (29th), Santa Monica, Calif., 20 May 66.

Descriptors: (*Uncertainty, *Armed forces research), Operations research, Research program administration, Effectiveness.

For abstract, see T 66 16.

N66-15323 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
METHODS OF QUADRATURE FOR EULER TRANSFORM INTEGRALS.
by P. M. Livingston. 22 Feb 65, 29p WIS-TCI-76
Grant NsG-275-62
NASA-CR-57042

Descriptors: *Euler equation, *Transform integral, *Quadrature approximation.

N66-15378 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
New York State Univ., Syracuse.
PRODUCT FORM OF INVERSES OF SPARSE MATRICES.
Progress rept.
by R. P. Tewarson. Nov 65, 8p
Grant NGR-33-015-013
NASA-CR-69270

Descriptors: *Matrix algebra, *Code, *Linear programming.

N66-16183 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Vanderbilt Univ., Nashville, Tenn.
PREDICTOR-CORRECTOR PROCESS IN WHICH THE SELECTION OF AN OPTIMUM CORRECTOR IS MADE EACH STEP.
Quarterly technical rept. Oct - Dec 65.
by J. R. Wesson. Nov 65, 12p
Contract NAS8-2559
NASA-CR-69882
Presented at the AM. Mathematical Soc. Meeting, Nov 12, 1965.

Descriptors: *Step function, *Differential equation, *Numerical analysis, *Predictor.

PB-170 542 **Field 12A, 9B**
CFSTI Prices: HC$4.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE THEORIQUE D'UN PROCESSUS ALEATOIRE DERIVE D'UN PROCESSUS DE POISSON PAR DIVISION (Theoretical Study of a Random Process Derived from a Poisson Process by Division),
by Jacques Freycenon. Mar 66, 47p CEA-R-2907
Text in French; Attached summary in English.

Descriptors: (*Input-output devices, Statistical processes), (*Fourier analysis, Computers), Analysis of variance, Correlation techniques, Scalers, Statistical functions, Sampling.

The time distribution of impulses issuing from a scaler (the 'divider') is studied when the input consists of impulses obeying a Poisson distribution. The variance of a single counting and the correlation between successive countings are computed. One derives then the autocorrelation function and spectral density of the instantaneous counting rate at the divider output. These results are applied to the Fourier analysis of the periodic sampling of the number of impulses issuing from the divider. It is shown that if one tries to increase the information rate received in the sampling device by mixing the impulses coming from several detectors, he can lower, by division, the mean counting rate of the sum signal without practically loosing information. The division must take place after mixing but not before. (Author)

AD-470 442 **See Field 5J**

AD-471 885 **See Field 22C**

AD-634 779 **See Field 20J**

AD-634 780 **See Field 7D**

AD-634 840 **See Field 20K**

AD-634 864 **See Field 6A**

AD-634 928 **See Field 8E**

AD-634 988 **See Field 20D**

AD-635 104 **See Field 5B**

AD-635 167 **See Field 6R**

AD-635 170 **See Field 10A**

AD-635 476 **See Field 8B**

AD-635 524 **See Field 20D**

AD-635 533 **See Field 13H**

PB-169 476 **See Field 15E**

PB-169 482 **See Field 5C**

12B. OPERATIONS RESEARCH

AD-634 821 **Field 12B, 9B**
CFSTI Prices: HC$4.00 MF$1.00
Carnegie Inst. of Tech., Pittsburgh, Pa.
SOME STUDIES IN GAME PLAYING WITH A DIGITAL COMPUTER.
Doctoral thesis,
by Thomas G. Williams. Jul 65, 132p
Contract SD-146

Descriptors: (*Game theory, *Digital computers), Artificial intelligence, Programming (Computers).

Identifiers: Theses.

The general trend in artificial intelligence is to try to write programs that have general problem solving ability, rather than ones that are particularly good at one specific task. The program described in this dissertation is designed to play a large number of common board and card games. To play a game in this system, it is necessary to describe the objects used in playing the game and the rules of the game to the system. Each object used in the game is represented by a symbol. The properties of that object are kept on a property list associated with that symbol. The rules of the game are represented by a sequence of 'if-then' statements. The 'if' portion of the statement describes a situation that can occur in the game; the 'then' portion descrithe action to be taken if that situation actually exists. Each situation and each action is described in terms of a primitive function of the system. An important part of any game playing program is the routine for searching for the various conditions that can arise in a game. This system contains a fairly efficient general searching routine which will perform most of the searching necessary for any of the common board games. This routine contains some useful automatic methods for using the results of past searches to reduce the amount of searching actually done. An analysis of the concepts needed to play various classes of games shows that only a few fundamental abilities are needed to play most of the common games. These abilities are included in the system. (Author)

AD-634 831 **Field 12B**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
CONTINUOUS CONTROL WITH STOCHASTIC STOPPING TIME,
by Allen Klinger. Jun 66, 28p RM-4993-PR
Contract AF 49 (638)-1700

Descriptors: (*Stochastic processes, *Control), Probability.

The criterion for a continuous control process whose stopping time is a random variable of known cumulative probability distribution is expressed as a single improper integral. (Physical examples of interrupted control situations are: regulator component failure, catalyst deterioration, space vehicle midcourse guidance, and random waiting for a digital computer used in the control of several systems.) A necessary condition for an optimal trajectory is derived, shown to be time-invariant only for the exponential probability law, and related to reliability theory. The optimal feedback control law, optimal trajectory, and minimum expected cost are presented for time-invariant linear systems with quadratic cost and exponentially distributed stopping time. A simple condition on the feedback rule for time-varying linear systems with arbitrary stopping time probability distribution is derived. A connection with the deterministic theory is established via the limit as the variance approaches zero. (Author)

AD-634 903 **Field 12B**
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
A COMPARISON OF PRIMAL AND DUAL METHODS OF LINEAR PROGRAMMING,
by Victor Klee. Apr 66, 20p D1-82-0520, Mathematical note-459

Descriptors: (*Linear programming, *Optimization).

For abstract, see T 66 16.

AD-635 056 **Field 12B, 15G, 5H**
CFSTI Prices: HC$1.50 MF$1.00
Carnegie Inst. of Tech., Pittsburgh, Pa. Center for the Study of Information Processing.
STUDIES CONCERNING MINIMAL TIME SOLUTIONS TO THE FIRING SQUAD SYNCHRONIZATION PROBLEM.
Doctoral thesis.
by Robert M. Balzer. 1966, 175p

Descriptors: (*Operations research, *Man-machine systems), Mathematical models, Problem solving, Military strategy, Optimization.

Identifiers: Theses.

This paper presents a description of a general outline for a minimal time solution to the firing squad synchronization problem, and a solution of this form which is composed of machines with only eight states. The paper then discusses the verification of this minimal time solution by computer simulation, and gives a mathematical induction proof that the solution works for any length. The paper then discusses some efforts to determine the minimal number of states needed for a minimal time solution. No four state minimal time solution exists. A reasonable set of conditions are presented for which no five state minimal time solutions exist. The final part of the paper demonstrates the equivalence of one-dimensional iterative arrays and turing machines, and shows how the techniques used here apply to problems of optimizing turing machines for a given computation. (Author)

AD-635 234 **Field 12B, 5A**
CFSTI Prices: HC$3.00 MF$0.75
Arizona State Univ., Tempe. Dept. of Industrial Engineering.
ANALYSIS OF STOCHASTIC NETWORKS.
Master's thesis.
by William Walton McDonald. May 66, 113p
Contract AF 33 (608)-1204

Descriptors: (*Stochastic processes, *Programming (Computers)), Simulation, Management engineering, Computer logic, Graphics.

Identifiers: Theses, PERT, GERT.

The purpose of this research was to: (1) develop a general purpose GERT Simulation Program, (2) investigate resultant distributions of GERT networks containing all AND nodes to determine validity of the PERT normality assumptions, and (3) investigate analysis of AND nodes through analytical and simulation methods for distribution of the equivalent time parameter. The Simulation Model is a fast, flexible, user-oriented computer program requiring only one input card for each activity in the network. Five probability density functions are available for use in describing the distribution of activity durations. Program output includes a criticality index on each activity and node analysis on specified nodes, including mean, variance, probability of realization and histograms of node realization times. Various GERT networks were simulated to provide examples of the use of the Simulation Model and verify results through statistical tests. Analysis of resultant distributions of PERT networks verified the PERT normality assumptions utilizing approximation formulas for mean and variance of activity durations. The merge bias correction procedure utilized to produce better approximations of network realization times was found not applicable to general solution of GERT networks containing AND nodes. (Author)

AD-635 282 **Field 12B**
CFSTI Prices: HC$4.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SUCCESSIVE APPROXIMATION BY QUADRATIC FITTING AS APPLIED TO OPTIMIZATION PROBLEMS.
by S. P. Azen. Jun 66, 30p RM-5001-PR
Contract AF 49 (638)-1700

Descriptors: (*Optimization, *Approximation (Mathematics)), (*Dynamic programming, Optimization), Numerical methods and procedures.

This memorandum investigates a technique of solving optimization problems by expanding the original functional about an approximating function to obtain a quadratic function which then can be solved exactly using dynamic programming. Applications and numerical results are presented for a one-dimensional example, a two-point problem, and approximations over a grid of points. (Author)

AD-635 283 **Field 12B, 15G**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE 'SPECIAL WEIGHTED DISTRIBUTION PROBLEM' OF LINEAR PROGRAMMING: AN APPLICATION AND A FORTRAN PROGRAM.
by L. H. Wegner. May 66, 54p RM-4867-PR
Contract AF 49 (638)-1700

Descriptors: (*Linear programming, *Military tactics), Programming (Computers), Distribution theory, Algorithms, Optimization.

As part of a computer model of theater tactical air operations in non-nuclear warfare, an aircraft-to-target assignment problem is formulated as a linear programming problem in which the 'value' of the unassigned aircraft is to be maximized. This problem is shown to be a special case of the 'Weighted Distribution Problem' of linear programming and, as such, to have two special features not shared by the general linear programs. An algorithm by H. M. Markowitz, taking advantage of these features of this 'Special Weighted Distribution Problem,' is presented after the introduction of background material necessary for the development of the algorithm. The solution of an example problem is included to illustrate the steps of the algorithm. In the application of the algorithm to the aircraft-to-target assignment problem, it may happen that there are not enough aircraft to fulfill the targeting requirements. (In the theater tactical air operations model this occurs at the end of a series of assignment problems in which targets with highest priority have already been assigned aircraft.) What is required in such circumstances is a procedure that in some sense maximizes the target requirements that are fulfilled. It is shown that Markowitz's algorithm can be generalized to provide a solution for one such formulation. A listing of the Fortran IV computer program for the generalized algorithm is contained in the Appendix. (Author)

AD-635 392 **Field 12B, 15E**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
RECENT WORK IN MULTI-ECHELON INVENTORY THEORY.
by E. P. Durbin, and R. D. Wollmer. 1 Jul 66, 15p P-3401

Descriptors: (*Inventory, Theory), Optimization, Model theory, Production, Stock level control, Logistics.

The paper contains summaries and discussions of the following three papers (1) Network Analysis of Multi-Product Production and Inventory Models, by W. I. Zangwill, University of California at Berkeley; (2) Optimal Policy for a Dynamic Multi-Echelon Inventory Model, by Stuart A. Bessler and Arthur F. Veinott, Jr., Stanford University; and (3) A Multi-Echelon, Multi-Item Inventory Model for Recoverable Items, by C. C. Sherbrooke, The RAND Corporation.

AD-635 497 **Field 12B**
CFSTI Prices: HC$3.00 MF$0.75
Operations Research Center, Univ. of Calif., Berkeley.
THE DUALPLEX METHOD FOR LARGE-SCALE LINEAR PROGRAMS.
by Saul I. Gass. Jun 66, 105p ORC-66-15
Contracts DA-31-124-ARO (D)-331, Nonr-222 (83)
Grant NSF-GP-4593.

Descriptors: (*Algorithms, *Linear programming), Operations research.

In Chapter II the author describes the dualplex algorithm as it applies to the general linear programming problem with the structure $b = IW + AX + BY$. The necessary proofs and formulas are given, along with a summary of the method and a numerical example. Chapter III describes how the algorithm would be applied to a 2-stage problem and then its extension to a general t-stage problem. A summary of the t-stage algorithm is given and a 2-stage numerical example is solved. Chapter IV represents specialization of the dualplex method to the bounded linear-programming problem, the generalized bounded problem, and the transportation problem and related systems. In each case, a new and efficient algorithm is developed. (Author)

AD-634 786 **See Field 15G**

AD-634 980 **See Field 14D**

AD-635 168 **See Field 14A**

AD-635 201 **See Field 5A**

AD-635 215 **See Field 9B**

AD-635 216 **See Field 9B**

PB-170 544 **See Field 18J**

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

PB-170 353 **Field 13A, 5C**
CFSTI Prices: HC$3.00 MF$0.50
Knox (Charles F.) and Associates, Madrid (Spain).
THE COMMERCIAL AND INDUSTRIAL REFRIGERATION MACHINERY AND EQUIPMENT MARKET IN SPAIN.
25 May 65, 55p
Prepared in cooperation with Business and Defense Services Administration, Department of Commerce, Washington, D. C. Prepared for presentation at Commercial and Industrial Refrigeration Exhibition, Madrid, March 7-17, 1966.

Descriptors: (*Refrigeration systems, Machines), (*Spain, Commerce), United States.

The need for increased industrial and commercial refrigeration facilities in Spain is urgent and extensive. A Government sponsored National Refrigeration Plan contemplates that the equivalent of at least $148 million dollars of capital investment is required to provide new facilities during 1965-68. Owing to the structure of the Spanish industry the greater part of the demand will be supplied from domestic sources, which include foreign companies affiliated with Spanish manufacturers producing refrigeration machinery and equipment under license. Nevertheless there is a competitive market for direct imports of certain items. Production and consumption figures are not available, but informed opinion, and an analysis of projected plans, indicates a market for direct imports of refrigeration machinery, equipment and components, possibly amounting to as much as $35 to $40 million dollars during the next four years. (Author)

AD-635 192 **See Field 20M**

AD-635 368 **See Field 11F**

PB-170 358 **See Field 11L**

13B. CIVIL ENGINEERING

AD-635 281 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.75
Wyoming Univ., Laramie.
PHYSICAL AND CHEMICAL MEASUREMENTS OF WASTE WATER STABILIZATION LAGOONS DURING WINTER OPERATION.
Master's thesis.
by Gailen O. Narum. May 66, 92p
Contract AF 33 (608)-1295

Descriptors: (*Wastes (Sanitary engineering), Disposal), (*Sewage, Processing), Cold weather tests, Oxidation-reduction reactions, pH, Oxygen, Atmospheric temperature, Solar radiation.

Oxidation-reduction potential, pH and dissolved oxygen content were measured at the city waste stabilization lagoons, Laramie, Wyoming, from November 17, 1965 until January 18, 1966. These measurements were correlated with air and water temperatures and solar radiation of the same period. Tabular results are presented and discussed. (Author)

PB-169 499 **Field 13B, 8M, 18D**
CFSTI Prices: HC$2.00 MF$0.50
Montana State Dept. of Highways.
NUCLEAR MOISTURE DENSITY EVALUATION.
Final rept., 1965.
by Robert T. Rask. 10 May 65, 39p Rept. no. 0134
Proj. 7906
Montana Highway Research Project in Cooperation with the Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Moisture), (*Soils, Moisture), (*Moisture, Density), (*Densimeters, Geiger counters), (*Radiation measurement systems, Densimeters), Gamma rays, Calibration, Health physics, Test methods, Effectiveness Density, Montana.

The report describes the testing procedures, analysis of data, and one make of a nuclear energized device for determining the moisture content and density of compacted embankment layers. Soils of various composition and gradation were tested and evaluated. Wide coverage of the State of Montana was investigated and findings compared with the results obtained by conventional methods. Both laboratory and field investigations were made with more emphasis being given to field tests. Good correlation between nuclear and conventional tests was obtained when reliable conventional tests could be made. Statewide investigations showed a broad spread of density calibration curves required for nuclear density readings. The efficiency of nuclear testing is found to be approximately 4.5 to 1 over conventional methods thus insuring more control of compaction operations and less delay for the contractor. The nuclear method also has the advantage of determining accurate tests in moderately rocky fills.

PB-169 522 **Field 13B, 8H**
CFSTI Prices: HC$7.50 MF$2.00
Office of Water Resources Research, Washington, D. C.
WATER RESOURCES RESEARCH CATALOG. PART I. FEDERALLY SUPPORTED RESEARCH IN PROGRESS.
Feb 65, 442p OWRR-1/1-Vol-1

Descriptors: (*Water supplies, Scientific research), (*Natural resources, Water supplies), Catalogs, Abstracts, Indexes, Water, Chemical properties, Meteorology, Hydrology, Control systems, Water pollution, Sewage, Disposal, Desalination, Purification, Economics, Sanitary engineering.

A summary is given for each of 1,545 projects in the following areas: Nature of water, water cycle, water and land management, development and control, qualitative aspects, re-use and separation, economic and institutional aspects, and engineering works. Corporate author, subject, supporting agency, and principle investigator indexes are included.

PB-169 899 **Field 13B**
CFSTI Prices: HC$2.60 MF$0.50
California State Div. of Highways.
A REPORT ON INDUCTIVE LOOP TRAFFIC DETECTION UTILIZING A COMMON SLOT.
by R. L. Donner, and M. E. Wilson. May 65, 21p Rept. no. 0222
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Counting methods), Tests.

The object of this test was to conduct a controlled traffic count at an inductive loop location to determine if interaction was occurring when using a common slot for the lead wires and loops. The common slot for lead wires and loop wires was used because of the feeling that a 2-foot offset between lead wire slots and loop slots increases the possibility of concrete pavement spalling. Interaction resulting in extra counts was not observed on this common slot installation during the test. An overall system error noted for a four hour count was + 2.2% that compares favorably with systems not having a common slot. (Author)

PB-169 900 **Field 13B, 13C**
CFSTI Prices: HC$5.60 MF$0.75
University of Southern Mississippi, Hattiesburg.
IMPROVEMENT OF SANDS AND GRAVELS FOR USE WITH ASPHALT.
Final rept.,
by Bahngreel W. Brown, and Charles W. Welby. 31 Dec 65, 60p Rept. no. 0418
Sponsored by the Mississippi State Highway Dept. in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Gravel, Surface-active substances), (*Asphalt, Bonding), Roads, Materials.

The purpose of this investigation was to evaluate the effectiveness of various commercial surfactants as aids in improving the adhesion or bond strength of asphalt to Mississippi quartzose gravels. An air bubble technique to measure the contact angle on treated quartz was first tried. Hysteresis effects made the measurements to imprecise that a good estimate of the angle could not be obtained. An alternate method using sessile water drops was tried and preliminary tests indicated that it would provide a technique for rapid quantitative evaluation of surfactants. The authors conclude, from theoretical considerations, that amines will not solve the asphalt bonding problem and suggest that fluorocarbons would be useful. (Author)

PB-169 901 **Field 13B**
CFSTI Prices: HC$2.60 MF$0.50
Florida State Road Dept. Div. of Materials, Research and Training.
REPORT ON THE EVALUATION OF A CORING RIG FOR THE PURPOSE OF REDUCING THE TIME INVOLVED TO DIG A UNIFORM DENSITY HOLE.
Final rept.,
by P. C. Todor. Oct 65, 21p Rept. no. 0424
Rept. on Evaluation of Coring Device for Reducing Time Involved to Dig a Uniform Density Hole.

Descriptors: (*Earth-handling equipment, Tests), Densimeters.

This report shows a suitable correlation of duplicate density tests made by a nuclear gage and a water-balloon apparatus in holes drilled with a portable coring rig. The drilled holes are completed in about one-half the time needed when using conventional methods in limerock base courses. The coring rig method is now used for routine construction control testing. (Author)

PB-169 902 **Field 13B, 13C**
CFSTI Prices: HC$3.00 MF$0.75
Ohio State Univ., Columbus. Engineering Experiment Station.
DEVELOPMENT OF SONIC AND ULTRASONIC POWER DEVICES FOR APPLICATION IN HIGHWAY ENGINEERING.
Interim rept. for 1965.
by Robert C. McMaster, Charles C. Libby, Hildegard M. Minchenko, Berndt B. Dettloff, and Donald R. Kibbey. 21 Dec 65, 91p EES-220-3, 0444
Proj. EES-220
Sponsored by Ohio State Dept. of Highways in cooperation with Bureau of Public Roads.

Descriptors: (*Power equipment, Acoustic equipment), (*Civil engineering, Power equipment), Roads, Construction.

The objective of the study is to develop equipment and systems to provide from one to ten or more horsepower of acoustical energy in forms practicable for highway engineering application. The study consists of theoretical and applied research directed toward increasing the knowledge in science of soundwaves when the wave energy is increased by several magnitudes. The application of this energy increase to useful purposes will follow in the course of the study. There is being conducted a theoretical mechanical vibration analyis, starting with the fundamentals of the theory of vibrations and working through to the analysis of more complex mechanical systems under dynamic excitation. Investigation to create a technique by which vibratory systems can be designed for some useful applications in highway engineering will form much of the study. The proposed applications will involve force output requirements from transducers for a given job, size and strength of components, driving frequency, etc., for friction alleviation, high energy impact blows, high local acceleration and multiple application acoustical equipment. (Author)

PB-169 908 **Field 13B, 18D**
CFSTI Prices: HC$3.00 MF$0.75
Purdue Univ., Lafayette, Ind. Joint Highway Research Project.
LABORATORY AND FIELD EVALUATION OF THE NUCLEAR MOISTURE AND DENSITY METERS.
by T. G. Williamson, and M. W. Witczak. 11 Feb 66, 94p Rept. nos. 435, 4
Proj. C-3616E
Prepared in cooperation with Indiana State Highway Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Hygrometers, Soils), (*Densimeters, Soils), (*Nuclear industrial applications, Civil engineering), Design, Tests.

This report gives detailed information on test procedures and results developed in the laboratory and field. The researchers used nuclear gages of three different commercial designs. Although this report is based on the use of equipment which is considered to be nearly obsolete, the techniques developed are of considerable value. Changes in operating characteristics of nuclear gages over a four-year period are correlated with theoretical principles of nuclear physics and electronics. The two appendices: 'Recommended Procedures for Use of Nuclear Gages' and 'Statistical Decision Procedure for Calibration Curve Acceptance' are a substantial contribution to the state of the art. (Author)

PB-169 927 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Public Roads, Washington, D. C.

ESTIMATING HIGHWAY NEEDS IN URBAN AREAS.
Apr 65, 28p

Descriptors: (*Roads, Urban areas), (*Traffic, Mathematical prediction), Transportation, Management planning.

The purpose of the report is to describe the results of the analyses which have been made and to show how the procedures developed may be used to estimate urban highway needs when detailed planning data are not available. Although these procedures may not provide acceptable estimates of highway needs in every urbanized area, they will provide a reasonable estimate of total urban highway needs on a statewide basis.

PB-169 930 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Colorado State Dept. of Highways. Planning and Research Div.
CAPACITY REPORT.
1962, 42p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Traffic), (*Colorado, Roads), Effectiveness, Signal lights, Numerical analysis, Volume.

The test of the nationwide capacity curves was based on detailed data gathered from a group of selected intersections. This group of intersections was chosen as known heavily used locations in the Denver Metropolitan Area. The results of the data from Denver proved the shape and form of the revised national curves to the satisfaction of the guiding committee. A family of adjusted curves was then developed which represented the denver area street capacities, where differences were detected from the national averages. The developed capacity curves were used in the calculation of the 484 intersections for which physical inventory, traffic signal light timing, and traffic volume counts were obtained. The results of these 484 calculations are shown in terms of two-way hourly approach capacity. (Author)

PB-169 938 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Automotive Safety Foundation, Washington, D. C.
AN ENGINEERING APPRAISAL OF MISSISSIPPI'S HIGHWAYS.
Supplemental rept. to the Mississippi Legislature.
1 Dec 61, 50p
Availability: Original document in color until exhausted.

Descriptors: (*Roads, Analysis), (*Mississippi, Roads), Engineering, Surface properties, Costs, Management planning, Trafficability, Economics, Maintenance.

A complete picture of long range construction, maintenance and administration needs was assembled in the engineering study for all road and street systems. The needs estimates represent a conservative analysis of what is necessary to catch up and keep abreast of traffic requirements. Through the information compiled in this and the companion fiscal study the legislature and responsible highway agencies of the state are in a position to move forward in development of realistic highway, road and street programs, based on soundly conceived and fixed road systems geared to equitable, long range fiscal plans. (Author)

PB-169 939 **Field 13B, 5A, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Public Administration Service, Chicago, Ill.
FINANCING IOWA'S HIGHWAYS 1961-1980.
Summary rept.
Dec 60, 26p
Availability: Original document in color until exhausted.

Descriptors: (*Roads, Economics), (*Economics, Roads), (*Iowa, Roads), Costs, Management planning, Money.

The report summarizes the results of the fiscal study which analyzed the capacity of the State, counties, and municipalities to support highway needs for the 10, 15, and 20 year catch up programs as determined by the engineering study. Financing the alternative programs developed by the needs study is related in this study to the separate jurisdictional levels, taking into account present and probable future revenues and economic development. Particular attention has been given to the relative size, use, and requirements of the several systems in suggestions for the apportionment of highway user revenues among the various levels of government.

PB-169 940 **Field 13B, 5A**
CFSTI Prices: HC$3.00 MF$0.75
Automotive Safety Foundation, Washington, D. C.
IOWA HIGHWAY NEEDS 1960-1980.
A plan to pace highway development with economic growth.
1 Nov 60, 83p
Availability: Original document in color until exhausted.

Descriptors: (*Roads, Management planning), (*Management planning, Roads), (*Iowa, Roads), Economics, Costs, Reviews, Traffic.

A brief summary was made of estimated needs on the 112,000 miles of roads and streets in Iowa in the 20-year period, 1960-1980. Basic recommendations for revision of system classification and for improved management and inter-governmental relations are also included. The report is based on engineering analysis of existing status of roads and streets compared to standards of design and maintenance required for future traffic. Projections of past trends to 1980 indicate: (1) A population gain of 400,000--all in cities--with a statewide total of 3,150,000 (2) A 40 percent rise in number of motor vehicles--reaching 1,800,000 (3) A 70 percent increase in total travel--reaching 20 billion vehicle miles annually. Some 63 percent of all travel is on rural and urban State Primary Highways, 19 percent on other urban streets, and 18 percent on secondary roads. (Author)

PB-169 941 **Field 13B, 5A**
CFSTI Prices: HC$4.00 MF$0.75
Jorgensen (Roy) and Associates, Washington, D. C.
KANSAS HIGHWAY NEEDS: AN ENGINEERING APPRAISAL.
Nov 62, 111p
Availability: Original document in color until exhausted.

Descriptors: (*Roads, Management planning), (*Kansas, Roads), (*Management planning, Roads), Economics, Safety, Accidents.

In the Needs Study, emphasis was placed on the importance of highway safety. A comprehensive analysis was conducted which correlated accidents on the State Highway System since 1956 with the sufficiency ratings of highway sections at the time accidents occurred. The results provide striking confirmation of the safety values associated with the development of good highways. For the period covered by the analysis, the average accident rate for the state system was 1.71 per million vehicle-miles. However, the better roads--those with sufficiency ratings of 80 or above--had an accident rate of 1.46, compared to 2.08 for roads with sufficiency ratings below 60. Obviously, a reduction in accidents and savings in lives and money would be attainable with a highway modernization program resulting in a higher level of sufficiency ratings. It is recommended that accident studies of this nature be continued by the Highway Commission, with the results summarized and publicized regularly to encourage understanding of the benefits of safer travel resulting from highway improvement programs. (Author)

PB-169 942 **Field 13B, 5C**
CFSTI Prices: HC$4.00 MF$0.75
Smith (Wilbur) and Associates, New Haven, Conn.
FISCAL ASPECTS OF KANSAS HIGHWAY PROGRAMS.
1962, 108p
Prepared in cooperation with Kansas State Highway Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Economics), (*Economics, Roads), (*Kansas, Roads), Money, Management engineering.

Total new revenue estimates amount to $14.42 million under the proposals, $8.92 million will be distributed to the State Highway Fund, $2.95 million to the counties, and $2.55 million to the cities. This means that $8.92 million will be available annually to meet estimated 15-year average needs of $11.10 million for the state system, $2.95 million to defray county needs of $3.80 million annually, and $2.55 million to meet the city needs of $9.70 million annually. These additional revenues will be derived from user sources, and it is realized that they will not meet the total needs. The state and county systems will still need approximately $1 million each; the municipal system will need $7 million. To permit the counties to raise the additional funds needed, it is recommended that the ceilings on the property tax rates for highway purposes be raised. The earnings-credit analysis showed that the cities were almost $25 million short on user revenues and almost $15 million long on non-user revenues. Therefore, it has been recommended that the laws be amended to permit the cities to raise additional revenues from municipal registration fees -- user sources. (Author)

PB-170 481 **Field 13B, 6F**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Water Conservation Branch.
AQUATIC WEED TEST STATION,
by T. R. Bartley. 1 Dec 65, 40p Rept. no. WC-24

Descriptors: (*Inland waterways, Algae), (*Algae, Control), Herbicides, Plants (Botany), Dams, Water supplies, Ecology, Growth, Flowmeters, Test facilities, Colorado.

Identifiers: Colorado-Big Thompson project.

An aquatic weed test station was established just east of Dam No. 1 on Carter Lake of the Colorado-Big Thompson Project. This station was constructed to provide a flowing-water facility to represent field conditions similar to that of irrigation canals for research on aquatic weed control methods. Key features of the facility include diversion dam, water control structure, flumes, drop structures, terminal structure, and holding pond. Flowing water and aquatic weeds will be maintained in the flumes throughout the growing season for various studies which will include the evaluation of promising control methods such as the testing of herbicidal and algaecidal materials, testing new techniques of applying herbicides, examination of ecological factors and plant growth characteristics, measuring residues of herbicides, determining effects of aquatic vegetation on channel capacity, and evaluating feeders for use in introducing dry and liquid weed control materials. Also, other data of a general nature pertinent to aquatic weed control will be obtained. (Author)

PB-170 486 **Field 13B, 14A**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Reclamation, Denver, Colo.
ECONOMIC JUSTIFICATION FOR CANAL LINING IN IRRIGATION DISTRIBUTION SYSTEMS.
by Oct 65, 55p

Descriptors: (*Irrigation systems, Economics), (*Inland waterways, Irrigation systems), (*Civil engineering, Inland waterways), Man-

agement planning, Feasibility studies, Cost effectiveness, Water supplies, Costs, Pipes, Drainage, Concrete, Distribution.

Guidelines for determining economic justification for lining or piping irrigation canals or laterals have been developed and are presented for use of project planners. A detailed economic analysis has been made of a selected existing unlined irrigation system, and of several alternative lined systems. Design Criteria for the alternative systems are discussed, and a method for estimating drainage requirements is described. Construction and O and M costs estimated for the alternatives are presented in detail. Results of the study show the value of water conserved generally to be the most significant factor in the economic justification of lining. In areas where there is an excess of irrigable lands for the available water supply, or where there are other valuable uses for the conserved water, canal linings will generally be justified. In some instances where there is not a valuable use for the conserved water, decreased costs and other increased benefits collectively may be sufficient to show justification for lining. Decreased costs may include reduced construction and O and M costs for the storage conveyance or drainage systems. The technique illustrated by the analysis of the selected study area rather than the results obtained for the specified conditions are intended as a guide for planning construction of new projects, or rehabilitation of existing systems. (Author)

PB-170 490 **Field 13B, 21D**
CFSTI Prices: HC$6.00 MF$1.25
Rand Development Corp., Cleveland, Ohio.
INVESTIGATION OF THE USE OF COAL FOR TREATMENT OF SEWAGE AND WASTE WATERS.
Research and development rept. no. 12, Nov 63-Oct 65.
by S. S. Carlton, C. M. Marr Jr, C. W. Foye, C. K. Owens, and R. A. Chicncone. Oct 65, 219p
Contract 14-01-0001-348

Descriptors: (*Coal, Sanitary engineering), (*Sewage, Purification), (*Wastes (Industrial), Purification), Wastes (Sanitary engineering), Adsorption, Liquid filters, Disposal, Impurities, Fuels, Combustion, Water pollution.

A laboratory study is described in which samples of all ranks of coal were tested for possible use in single-step waste treatment applications, such as adsorption, filtration, and settling. It was shown that all coals are capable of adsorbing dissolved matter from sewage and that coal is useful as an aid in the flocculation and settling of sewage solids and as a filter medium capable of removing suspended solid matter. There was no evidence that coal introduces impurities to the water. A semicontinuous development apparatus is described in which the laboratory test data were assembled into a process capable of operating continuously to attain a degree of sewage treatment exceeding that of present methods when selected coals are used. The report contains a brief discussion of the nature of coal, and sewage, and present methods of sewage treatment as well as a detailed study of analytical and test methods used in the study. It also describes a study of various industrial wastes, including the 'black water' product of coal preparation ,along with a discussion of how the process might eventually be used for a variety of water renovation and waste disposal applications where heat is recovered from the incineration of the coal sewage by-product. (Author)

PB-170 496 **Field 13B, 11I**
CFSTI Prices: HC$3.00 MF$0.50
West Virginia State Road Commission, Charleston.
USE OF URETHANE FOAM AS A BRIDGE DECK INSULATOR.
by R. E. Davis. 1966, 48p
Contract SRC-11
Prepared in cooperation with Bureau of Public Roads, Wahsington, D. C.

Descriptors: (*Bridges, Thermal insulation), (*Thermal insulation, Expanded plastics), (*Isocyanate plastics, Thermal insulation), (*Expanded plastics, Bridges), Roads, Freezing, Thermal expansion, Inhibition, Concrete, Thickness.

The purpose of the study was to evaluate urethane foam as an insulator when it was applied to the underside of a concrete bridge deck in varying thicknesses. The thicknesses of urethane foam used for this study were: one-half, three-quarter and one inch. Thermocouples were placed in the bridge deck and approach at strategic locations and connected to an automatic strip-chart temperature recorder. From the resulting data the relative freeze-thaw times of the bridge deck sections and approach could be compared. The one inch thickness of urethane foam gave some indications it would delay freezing of the bridge deck slightly. Due to variables mentioned in the report, definite conclusions still seem to be few with regards to the insulating effect of urethane foam. (Author)

PB-170 511 **Field 13B, 13C**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
REPORT ON HARD-ROCK TUNNELLING INVESTIGATION,
by Ronald C. Hirschfield. 15 Oct 65, 63p
Contract C-85-65

Descriptors: (*Earth handling equipment, Civil engineering), (*Civil engineering, Earth handling equipment), (*Rock (Geology), Earth handling equipment), Engineering geology, Drilling, Cratering, Costs, Transportation, Construction.

Identifiers: Tunnelling (Civil engineering).

The report surveys the technology of hard-rock tunneling, with particular emphasis on tunneling machines, and is part of the overall study necessary to establish the relative feasibility of tunnel, surface, and elevated routes for a High Speed Ground Transport (HSGT) system. Drilling-and-blasting is the conventional method of hard-rock tunnel excavation. Despite many technological improvements in recent years the cost of conventional tunneling appears to be rising. Tunneling machines have been used successfully on about 20 projects in the last 10 years or so. Most of the successful machines have worked in the softer rocks, usually under quite favorable geologic conditions. On some projects machine tunneling has been faster and cheaper than drilling-and-blasting, but the number of machine-bored tunnels is too small to make quantitative comparisons of the two methods at the present time. It is recommended that a program be initiated for the development of improved tunneling machines, capable of boring harder rocks and coping with more adverse geologic conditions than present-day machines. In addition, a program is recommended for encouraging greater use of tunneling machines by agencies currently engaged in tunnel construction. Several other methods of hard-rock excavation are mentioned briefly, including nuclear, thermal, and hydraulic methods. These methods have not been studied in detail.

PB-170 567 **Field 13B, 7B**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
SIZE DETERMINATION OF ATMOSPHERIC SULFATE AND CHLORIDE PARTICULATES.
Final rept.,
by Francis L. Ludwig, Dale M. Coulson, and Elmer Robinson. Feb 66, 77p
Contract PH-86-64-54
Proj. SRI PAU-4748

Descriptors: (*Air pollution, Particle size), (*Particle size, Air pollution), (*Sulfates, Particle size), (*Chlorides, Particle size), Aerosols, Atmosphere, Determination, Samplers, Urban areas, Spectrum analyzers, Organic materials.

The research program was concerned with measuring the size distributions of the sulfate, chloride, and organic fractions of West Coast urban aerosols. The sulfate aerosol sampling program for 1964 and 1965 provided a total of 74 size distributions using the aerosol spectrometer technique. A typical size distribution for these data has a mass mean diameter of about 0.35 micron, a lower quartile of about 0.1 micron, and an upper quartile at about 1.0 micron. When size distributions were grouped and averaged according to the prevailing relative humidity for the test, there was a definite tendency for larger sizes to accompany higher humidities. When the size distribution data are grouped and averaged according to the time of day when the sample was collected, a diurnal variation is shown. When the size data were grouped and averaged according to sampling site it was found that the San Francisco data showed the smallest aerosol size with a mass median equivalent diameter for the seven samples being about 0.2 micron. During the 1965 sampling program a number of samples were taken with the Anderson sampler, a cascade impactor. The Anderson sampler is especially useful in the aerosol size range from 1.0 to 9.0 microns.

PB-170 765 **Field 13B, 13F, 15E**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Public Roads, Washington, D. C.
HIGHWAY SAFETY RESEARCH ORGANIZATIONS AND RESOURCES IN THE UNITED STATES.
Mar 66, 49p
A section of the International Road Safety Research Directory prepared for the Organization for Economic Cooperation and Development.

Descriptors: (*Roads, Safety), (*Passenger vehicles, Safety), (*Traffic, Safety), (*Transportation, Safety), Accidents, Scientific research, United States, Motor vehicle accidents.

Identifiers: Highways, Organizations.

An alphabetical listing is given of twenty-three organizations, including institutes, projects, groups, centers, bureaus, laboratories. The list is preceded by the estimated financial commitments for the 1965 projects according whether the project is for the driver, the vehicle, the highway, or the system.

PB-170 766 **Field 13B, 13F, 15E**
CFSTI Prices: HC$4.00 MF$0.75
Automotive Safety Foundation, Washington, D. C.
TRAFFIC CONTROL AND ROADWAY ELEMENTS THEIR RELATIONSHIP TO HIGHWAY SAFETY.
1963, 122p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Safety), (*Roads, Safety), Control, Control systems, Accidents, Motor vehicle accidents, Motor vehicles, Railroad tracks, Velocity, Illumination, Bridges.

Identifiers: Highways.

The report has tried to assemble and interpret a broad cross-section of the significant research on the effects of roadway elements and traffic control measures on highway accidents. It is based on exhaustive review and analysis of engineering studies conducted both in this country and abroad. The report consists of a summary of research and a bibliography of pertinent literature. The summary cites representative documents which embody the different methods of study and the different conclusions, theories, and findings appropriate to each subject. (Author)

AD-634 907 **See Field 4A**

PB-169 482 **See Field 5C**

PB-169 918 See Field 8G

PB-169 919 See Field 8G

PB-169 920 See Field 8G

PB-170 313 See Field 5C

PB-170 360 See Field 9F

PB-170 498 See Field 13M

PB-170 638 See Field 8H

PB-170 798 See Field 13F

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PB-169 900 See Field 13B

PB-169 902 See Field 13B

PB-169 919 See Field 8G

PB-170 511 See Field 13B

13D. CONTAINERS AND PACKAGING

PB-170 348 **Field 13D, 13I, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Norris and Elliott, S. A. de C. V., Mexico City.
THE PACKAGING AND PACKING MACHINERY MARKET IN MEXICO.
by Charles R. Quick. Dec 65, 33p
Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C. Prepared for presentation at U. S. Industrial Equipment Exhibition, Mexico City, August 1-13, 1966.

Descriptors: (*Packaging, Commerce), (*Packing materials, Commerce), (*Mexico, Packaging), United States, Machines.

Recommendations: A commercial exhibition of short-run, multi-purpose packaging machinery and equipment would stimulate the present small market. Manufacturers participating in the exhibition should be prepared to: Distribute catalogues ir specification sheets to visitors - printed in the Spanish languate. Provide competent technical personell for demonstration of their equipment. Discuss prices, available financing plans, delivery schedules, and service facilities. (Author)

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

AD-635 171 **Field 13E, 13J, 11F**
CFSTI Prices: HC$6.00 MF$0.50
Case Inst. of Tech., Cleveland, Ohio.
THE FUNDAMENTAL FACTORS INFLUENCING THE BEHAVIOR OF WELDED STRUCTURES UNDER CONDITIONS OF MULTIAXIAL STRESS, AND VARIATIONS OF TEMPERATURE, STRESS CONCENTRATION, AND RATES OF STRAIN.
Technical rept. 1 Jul 47-1 Sep 48.
by G. Sachs, L. J. Ebert, and A. W. Dana. 10 May 49, 34p
Contracts NObs-45470, NObs-34231
Proj. SR-99
SSC-24
Previously announced 10 Jul 50 as PB-100 737, Lcmi $2.25 ph $5.00.

Descriptors: (*Welds, *Ship plates), (*Steel, Welds), Failure (Mechanics), Hardness, Transition temperature, Ductility, Stresses, Temperature, Notch toughness.

A detailed study was made of a low carbon ship plate steel, both 'as received' and 'as welded', by utilizing hardness tests and eccentric notch bar static tension tests at various temperatures. Considerable nonuniformity was revealed in the 'as received' plate, that is, localized areas showed relatively high transition temperatures. A brittle-ductile transition zone was found to exist between -40 and -80F for the investigated steel. A zone of maximum hardness occurred at the junction of the weld metal and the heat affected zone, from which the hardness (Rockwell B) approached that of the unaffected plate. A zone of minimum ductility (eccentric notch strength) was found 0.3 to 0.4 inch from the weld centerline. This zone was located by using the eccentric notch bar tension test at low temperatures. The zone of low ductility is thought to be the zone which is heated to the maximum subcritical temperature, with the further possibility of embrittlement by strain aging and intermediate transformation products. (Author)

AD-635 181 **Field 13E, 13J, 11F**
CFSTI Prices: HC$6.00 MF$0.75
Cornell Univ., Ithaca, N. Y.
FATIGUE TESTS OF SHIP WELDS.
Final rept. 31 Aug 45-31 Aug 47.
by S. C. Hollister, J. Garcia, and T. R. Cuykendall. 4 Feb 48, 108p
Contract NObs-31218, NObs-34231
Proj. SR-89
SSC-14
Previously announced Aug 49 as PB-98198, LCmi$4.50, ph$3.75.

Descriptors: (*Welds, Fatigue (Mechanics)), (*Fatigue (Mechanics), *Ship plates), Steel, Stresses, Fracture (Mechanics).

The report summarizes the results of an investigation of the relative fatigue behavior of plates with (a) longitudinal ship welds, (b) reinforced and unreinforced flame cut openings, and (c) flame cut edges. The specimens, of the order of 12 to 17 inches wide and 7 feet long, were constructed from 3/4in plate of semi-killed shipbuilding steel and were subjected to zero-to-tension loading in especially built fatigue testing machines. The stress range generally was 0 - 30,000 psi tension. Fatigue control specimens were flat plates of tensile-coupon shape with flame cut edges. It was concluded that for a stress range of approximately zero-to-30,000 psi tension the characteristics of the flame cut edge were not significant in determining fatigue life within 500,000 cycles of stress. In comparison to the control specimens, longitudinal welds showed a greatly reduced fatigue life. All fatigue fractures started in the weld metal itself, usually in regions of porosity, deep surface ripples, poor root fusion, etc. Improved fatigue life for specimens with ground weld surfaces indicates that surface ripples, folds, or pits are incipient points of fatigue failure. The change in width from 12in to 16in is not believed to be a significant. All specimens with reinforced openings had a very short fatigue life (less than 30,000 cycles). Unreinforced, as cut, openings had a greater fatigue life than the reinforced openings. Treatment of the surface by grinding or by heat treatment markedly increased the fatigue life. (Author)

13F. GROUND TRANSPORTATION EQUIPMENT

AD-463 853 **Field 13F**
CFSTI Price: HC$16.10
United States Rubber Tire Co., Detroit, Mich.
DEVELOPMENT OF TIRES FOR NEW FAMILY OF MEDIUM TACTICAL TRUCK.
Final rept., phase 3,
by L. S. Stokes, and W. C. Macklem. Dec 62, 94p
Contract DA-20-018-ORD-20440
Proj. 215, 219
Availability: Microfiche only after original copies are exhausted.

Descriptors: (*Tires, Cargo vehicles), (*Cargo vehicles, Tires), Military requirements, Specifications, Nylon, Rayon, Rubber, Wire, Mobility, Performance (Engineering), Experimental data.

A relatively recent concept in tire design, the 'radial belted tire', has been utilized to develop an optimum tire for the New Family of Medium Tactical Trucks. Experimentation has established the most desirable radial tire for tactical demands as one composed of a rigid steel breaker belt and a radial textile carcass. The use of synthetic stocks had no appreciable effect on tire performance. This tire affords significant advantages in tire and vehicle performance. Tread wear, mobility, fuel economy, crown penetration resistance, durability, ride and handling, run flat maneuverability, climbing ability; and tire mechanics in terms of load distribution, and contact area are improved. Power consumption, running temperature and rolling resistance, are decreased. The above attributes when consolidated can be expressed as: increased ton miles per hour delivered, a possible universal inflation system, greater vehicle mobility and efficiency, increased combat time, reduced driver fatigue, and other economies in terms of gas consumption, tire economies, and vehicle maintenance and logistics.

AD-634 908 **Field 13F, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
RESONANCE TESTS ON A MOTOR CAR BODY.
Technical rept.
by D. R. Gaukroger, and F. J. Hawkins. Jan 66, 47p TR-66022

Descriptors: (*Vehicles, Stresses), (*Tests, Resonant frequency), Great Britain, Vibration, Structural shells, Passenger vehicles, Test methods.

Resonance tests on the body of a small two-door motor car have been made. Multipoint excitation has been used to excite the first five modes of vibration. It is shown that multipoint excitation has advantages over single point methods, and that the increased accuracy that it affords may be of use in locating regions of high stress. (Author)

PB-169 555 **Field 13F, 9B, 5B**
CFSTI Prices: HC$3.00 MF$0.75
System Development Corp., Santa Monica, Calif.
BAY AREA TRANSPORTATION STUDY COMMISSION INFORMATION SYSTEM: DATA DESCRIPTION AND DOCUMENTATION.
Technical memo.
by Vladimir V. Almendinger, and Joel M. Kibbee. 22 Dec 65, 72p TM-2690/000/00
Contract SDC-13660

Descriptors: (*Data processing systems, Transportation), (*Transportation, Documentation), (*California, Transportation), Information retrieval, Data storage systems.

Identifiers: San Francisco Bay area.

The Bay Area Transportation Study Commission (BATSC) Information System provides for data organization, manipulation, description, and documentation. The document describes the Data Documentation System (DDS), which is concerned with exposing the contents of the data base to the user. The user names, describes, and defines data base entries; this data exposition is entered into data reference files, which, by means of the DATADOX system, produce a set of DDS reports which serve as desk aids to the user. The DATADOX system is a set of MADAM procedures on the IBM-1401. (Author)

PB-169 570 **Field 13F, 9B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.

A SURVEY OF GRAPHIC DISPLAY SOFTWARE FOR OFF-LINE PLOTTING.
Technical memo.
by Joel I. Chess. 25 Oct 65, 15p TM-2699/000/00

Descriptors: (*Display systems, Graphics), (*Transportation, Programming (Computers)), (*California, Transportation), Management planning, San Francisco Bay, Statistical analysis, Maps, Plotters.

Identifiers: San Francisco Bay area, SPAN (Statistical processing and analysis).

The Bay Area Transportation Study Commission will use an off-line data plotter as one means of providing graphic display of information. System Development Corporation, as part of its information system design contract with the Commission, is developing a graphic display capability to be incorporated into the SPAN system. A survey of some of the current work in the data plotting field was made to provide a guide to this development. The document contains a bibliography resulting from the survey, and also reports on visits which were made to several installations. (Author)

PB-170 798 **Field 13F, 13B**
CFSTI Prices: HC$5.00 MF$1.00
Whitten (Herbert O.) and Associates, Washington, D. C.
TRAIN AUTO FERRY OPERATIONS.
Final rept.
by Herbert O. Whitten. 26 Nov 65, 158p
Availability: Original document in color until exhausted. A summary of present and proposed concepts and recommendations for a demonstration project.

Descriptors: (*Passenger vehicles, Transportation), (*Railroads, Cargo), Civil engineering, Economics, Feasibility studies.

Identifiers: Train auto ferry, Autotrain, High-speed passenger transportation, High-speed Ground Transportation project.

The idea of moving passengers and their automobiles by train from a point of origin to a common destination is examined. This report summarizes and comments on those that have been located to this date; analyzes potential costs and prices for such service if operated in this country; and makes recommendations for a proposed demonstration project of such service.

AD-635 240 **See Field 15E**

AD-635 241 **See Field 15E**

AD-635 242 **See Field 15E**

PB-170 765 **See Field 13B**

PB-170 766 **See Field 13B**

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

AD-635 227 **Field 13G, 9B**
CFSTI Prices: HC$1.50 MF$0.75
Johnson Service Co., Milwaukee, Wis. Research Div.
FLUERICS: 19. LOW-PRESSURE AMPLIFIER AND ANALOG COMPUTER.
Rept. for 1 Oct 64-30 Sep 65.
by Thomas J. Lechner. Apr 66, 72p
Contract DA-49-186-AMC-126 (D)
Projs. DA-1P014501A338, HDL-31100
See also AD-629 056.

Descriptors: (*Fluid amplifiers, *Analog computers), Integrators (Computers), Gain, Computer logic, Differential equations, Fluid dynamic properties.

Identifiers: Fluerics.

The report describes the design and performance of flueric operational amplifiers and integrators. The amplifier gains and integrator rate gains are shown to depend only upon the passive circuitry. First- and second-order linear differential equations with constant coefficients have been solved effectively with these computing devices. Less than 2-percent deviation resulted between the computed and calculated first-order solutions. Computation of the second-order equations with damping greater than 0.8 also showed errors of 2 percent or less. With damping less than 0.8 but greater than 0.4, the error was less than 5 percent; with lighter damping including zero damping, the error was 8 percent or less. Also included are suggestions for improving system accuracy and expanding the state-of-the-art for flueric computing systems. (Author)

AD-635 272 **Field 13G**
CFSTI Prices: HC$1.50 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE DESIGN OF ONE CLASS OF SERVO SYSTEMS CLOSE TO THE OPTIMAL.
by A. A. Vavilov, and F. F. Kotchenko. 13 Jan 66, 23p FTD-MT-64-305
TT-66-61684
Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Elektromekhanika (USSR) n8 p961-72 1963.

Descriptors: (*Servomechanisms, Optimization), USSR, Servomotors, Automatic, Control systems.

In servo systems with a small zone of linearity it is possible, to realize operating conditions close to the optimum, during maximum signal at input of system and with limitation of voltage in the motor, by fulfilling certain relationships between parameters of the system. Results of an experimental investigation of a high-speed servo system of automatic compensator EPP-09 indicate that the necessary relationships between parameters in such system may be comparatively simply realized in practice. (Author)

13H. INDUSTRIAL PROCESSES

AD-461 705 **Field 13H, 11F**
CFSTI Price: HC$3.60
Brown Univ., Providence, R. I.
RESTORATION OF DUCTILITY OF HOT OR COLD STRAINED ABS-B STEEL BY HEAT TREATMENT AT 700 TO 1150F,
by C. Mylonas, and R. J. Beaulieu. Apr 65, 32p
Progress rept. no. 4
Contract NObs-88294
Proj. SR-158
SSC-167
Rept. on Manufacture Fundamentals.

Descriptors: (*Steel, Heat treatment), (*Heat treatment, Steel), (*Ductility, Steel), Fracture (Mechanics), Brittleness, Cold working, Hot working, Welds, Ship plates, Strain (Mechanics).

The severe embrittlement caused by a suitable history of strain and temperature has been confirmed also for steel conforming to ABS-B classification. Steel prestrained in compression by about 50% at 70F and subsequently tested in tension fractures at an extensional strain of the order of 1%. Prestraining at 550F by even 25% can cause brittleness in extension at -16F. Local severe embrittlement of this nature has been shown to be the basic cause of the static initiation of brittle failure of structures at low average stress. This is confirmed by service failures, whose origin is frequently traced to cold worked areas, or to the hot strained regions of defects close to welds. It is shown that a suitable heat treatment can restore appreciable ductility to steel embrittled by hot or cold straining. The duration of heating decreases with the temperature, but increases very rapidly with the amount of prestrain. To each temperature corresponds a limiting prestrain for which heat treatment becomes impractically long. Cold strained steel requires considerably longer heat treatment and higher temperatures (1000-1200F) than hot strained steel (700-1000F). Approximate time-temperature-prestrain curves have been experimentally determined. The results confirm that a major beneficial effect of the so-called 'thermal stress-relieving' treatment is a restoration of the ductility of locally embrittled steel. (Author)

AD-634 916 **Field 13H, 11F**
CFSTI Prices: HC$1.50 MF$0.50
Springfield Armory, Mass.
HIGH-ENERGY RATE-FORMING.
Technical rept.,
by E. H. Abbe, and J. F. Panda. 27 May 66, 37p
SA-TRI8-1101
Proj. M1-3-23038-01-M1-M6

Descriptors: (*Explosive forming, *Steel), Pipes, Effectiveness, Thickness, Deformation, Gases, Hydraulic systems, Exploding wires, Performance (Engineering).

Identifiers: HERF, Steel 4130, Steel 1015.

Thin-wall 1015 and 4130 tubular steel specimens were bulged to a simple shape using explosive, electrohydraulic and cartridge-hydraulic techniques to determine the effects of structure and energy media upon the formability of the two materials. Maximum expansion (40 per cent) without splitting was obtained with the cartridge-hydraulic system on the spheroidized 4130 steel tube specimens. Pressures, rise times, strain rates, and metal-deformation velocities were determined for the specimens bulged with thecartridge-hydraulic system. Reduction of wall thickness and increase in hardness of the two materials in the bulged area were comparable for all three forming techniques in both the spheroidized and annealed conditions. (Author)

AD-635 027 **Field 13H, 1C, 11F**
CFSTI Prices: HC$3.00 MF$0.50
North American Aviation Inc., Los Angeles, Calif.
DEVELOPMENT AND EVALUATION OF DIFFUSION BONDED LAMINATED SECTIONS.
Interim engineering rept. no. 1, 15 Mar-30 Jun 66,
by Paul Miskulin, Harold J. Greenspan, and Ronald D. Brunken. 30 Jun 66, 52p
Contract AF 66 (615)-3515
AF-9122
AFML-IR-9122-I

Descriptors: (*Airframes, Laminates), (*Diffusion bonding, *Titanium alloys), (*Laminates, Diffusion bonding), Aluminum alloys, Vanadium alloys, Tin alloys, Presses (Machinery), Sheets, Ductility, Surface properties.

Identifiers: Titanium alloy 6Al 2 Ln 6V.

Efforts in the development of press bonding of Ti-6Al-6V-2Sn during this period consisted of constructing an 8 by 8-inch platen press and testing the functioning of the equipment. Minor adjustments in pressure control were required to achieve precise bonding pressures. Evaluation of bonding paramet s consisted of producing 12 3 by 3 by 3-inch billets. Bonding temperatures varied, in addition to percent billet deformation and hold time at bonding temperatures. Several tooling concepts were tested to examine the need for internal and external tooling in making laminate sections. These studies revealed the need for internal tooling support. Metallographic examination of bonded laminates showed that well-bonded joints could be obtained, but billet deformations in excess of 20 percent were required to achieve uniformly high ductility throughout the billet. Appropriate bonding temperatures are between 1600F and 1650F. Studies of sheet finish were conducted. A 2D finish was required to produce soundly bonded laminates. Grit blasted finishes produced bonded interfaces with pronounced voids. Experi-

ments were conducted on reducing the amount of edge bulging. Boron nitride was found to be a promising material to reduce friction between the retort and billet. (Author)

AD-635 043 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
Thermal Dynamics Corp., Lebanon, N. H.
PLASMA ARC MACHINING.
Final rept.
by James F. Ordway, George A. Colligan, and James A.Browning. May 66, 86p
Contract DA-19-066-AMC-275 (W)
Proj. PEMA-6261
AMRA-CR-66-03/F

Descriptors: (*Machining, Plasma physics), Torches, Plasma jets, Steel, Titanium, Electric arcs, Surface properties.

Identifiers: Plasma torches.

The concept of metal removal by Plasma-Arc machining utilizing DC transferred and non-transferred arc techniques was explored. Tests on various metal alloys at a power level of 50KW show that optimum torch-to-work geometry, feed and surface speed provide high removal rates. Surface finishes of 30 microinch (RMS) were obtained and metallurgical changes were generally of a surface nature. A variety of workpieces including low and medium carbon, low alloy and high nickel steels and titanium were used in the tests. (Author)

AD-635 083 **Field 13H, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
HEAT TREATMENT OF TITANIUM AND TITANIUM ALLOYS.
by F. F. Schmidt, and R. A. Wood. 20 Apr 66, 70p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM X-53445, RSIC-493
See also AD-633 247.

Descriptors: (*Heat treatment, *Titanium), (*Titanium alloys, Heat treatment), Thermal properties, Microstructure, Stress relieving, Annealing, Chromium alloys, Aluminum alloys, Tin alloys, Vanadium alloys.

Identifiers: Titanium alloy 5Al 2.5 Sn, Titanium alloy 6Al 4V, Titanium alloy 3Al 11Cr 13V.

The report reviews present heat treatment practices for titanium and titanium alloys. It describes the methods, techniques, and equipment currently employed in the thermal treatment of titanium materials, and the necessary processing considerations and precautions that govern these treatments. The metallurgical background illustrating the principles used in titanium heat treatment is also discussed with respect to alloy classifications, structures, and hardening mechanisms. (Author)

AD-635 486 **Field 13h**
CFSTI Prices: HC$1.00 MF$0.50
Martin Co., Denver, Colo.
CENTER FOR HIGH ENERGY FORMING.
Quarterly technical progress rept. no. 4, 1 Apr-1 Jul 66.
by A. A. Ezra. Jul 66, 26p
Contract DA-19-066-AMC-266 (X)
AMRA-CR-66-05/4
Prepared in cooperation with Denver Univ., Colo.

Descriptors: (*Explosive forming, Reports), Information retrieval, Hardening, Strain (Mechanics), Differential equations, Equations of motion, Deformation, Hemispherical shells.

Identifiers: HERF.

A key word end identifier list has been prepared to facilitate the retrieval of documents relevant to High Energy Forming, which are being incorporated into a computer retrieval program. The development of instrumentation has continued for two classes of experiments. One is the plane wave loading of flat specimens using mousetrap techniques for shock hardening studies. The other is the expanding ring technique for determining dynamic stress-strain relations. Solutions have been obtained for a set of simplified differential equations of motion of the large dynamic plastic deformation of circular blanks. Experimental checks have shown fair agreement. The largest source of error is in the estimate of energy delivered to the blank from the explosive. Firsthand coupling experience was obtained with an Air Force program for explosively forming 10-ft-diam domes for the Titan. Technical difficulties arose that were solved by personnel of the Center. Problems identified will be reflected in the future research programs of the Center. The first 10-ft production dome was successfully formed on June 24, 1966. (Author)

AD-635 533 **Field 13H, 12A**
CFSTI Prices: HC$4.00 MF$1.00
Naval Avionics Facility, Indianapolis, Ind.
MINIMUM SIZE SAMPLING PLANS FOR SMALL LOTS FOR A GIVEN LOT TOLERANCE PERCENT DEFECTIVE (LTPD) AND PROBABILITY OF ACCEPTANCE.
by Cynthia D. Lague. 30 Jun 66, 151p NAFI-TR-504

Descriptors: (*Sampling, Tables), Acceptability, Probability, Quality control, Standards, Military requirements.

This report presents a set of tables which give the minimum sample size required to accept a small lot with the probability of acceptance less than or equal to beta for a given LTPD. The tables are based on the hypergeometric probability distribution for lot sizes N of 10 (5) 100; beta of 0.01, 0.025, 0.05, 0.10 (0.10) 0.90, 0.95, 0.975 and 0.99; and acceptance numbers a of 0 (1)3. (Author)

N66-15377 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
TECHNOLOGY UTILIZATION REVIEW ANΓ ANALYSIS. VOLUME I.
Final rept. 28 Feb-31 Aug 64.
by L. F. Bernbach, and D. E. Kaufman. Sep 64, 41p NSL-64-192-Vol-I
Contract NAS7-277
NASA-CR-69269

Descriptors: *Ranger Block III, *Biochemical fuel cell, *Protein, *Solar cell, *Technology (Gen).

For abstract, see T 66 16.

N66-15815 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
RESEARCH AND DEVELOPMENT OF MATERIALS FOR USE AS LUBRICANTS IN A LIQUID HYDROGEN ENVIRONMENT.
Final rept. Jul 64-Nov 65.
by W. H. Rempe, and W. E. Young. 29 Oct 65, 69p PWA-FR-1602
Contract NAS8-11537
NASA-CR-69569

Descriptors: *Lubricant, *Liquid hydrogen, *Rolling contact bearing.

N66-15822 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
Harvey Aluminum, Torrance, Calif.
RESEARCH PROGRAM TO DEVELOP A TECHNOLOGY IMPROVEMENT PROGRAM FOR CLOSED DIE FORGING.
Progress rept. no. 4, Sep-Nov 65.
by J. R. Long. Dec 65, 94p HA-2203
Contract NAS8-20093
NASA-CR-69572

Descriptors: *High strength alloy, *Aluminum alloy, *Die, *Forging.

N66-15846 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Martin Co., Baltimore, Md.
SATURN HELIUM BOTTLES.
by R. A. Hirsch. Oct 65, 34p ER-14012
Contract NAS8-11555
NASA-CR-69618

Descriptors: *Helium, *Saturn S- IC stage, *Storage tank.

N66-15986 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
SEMICONDUCTOR WAFER IMPROVEMENT THROUGH PHOTOENGRAVING.
Final rept. 1 Mar-1 Jul 65.
by C. J. Taylor. 1965, 35p
Contract NAS5-3758
NASA-CR-69678

Descriptors: *Etching, *Photoengraving, *Silicon, *Semiconductor.

N66-15987 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
PHASE III OF GROOVE ETCH STUDIES, OXIDE BARRIER ISOLATION.
Final rept. 1 Feb-1 Jun 65.
by G. W.Skouson. 1965, 32p
Contract NAS5-3758

Descriptors: *Epitaxial deposition, *Etching, *Integrated circuit, *Silicon, *Single crystal.

N66-15988 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
EPITAXIAL PROCESS FOR DEVELOPMENT FOR MONOLITHIC COMPLEMENTARY MOSFET STRUCTURE WITH OXIDE BARRIER ISOLATION.
Final rept. 15 Mar-15 Sep 65.
by G. W. Skouson. 1965, 29p
Contract NAS5-3758
NASA-CR-69680

Descriptors: *N-Type semiconductor, *Epitaxial deposition, *Etching, *P-Type semiconductor, *Silicon.

N66-18019 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Lima, Ohio. Aerospace Electric Div.
RESEARCH AND DEVELOPMENT PROGRAM ON MAGNETIC, ELECTRICAL CONDUCTOR, ELECTRICAL INSULATION, AND BORE SEAL MATERIALS.
Final rept. Aug 63-Dec 64.
by P. E. Kueser. Jan 65, 30p WAED-65-37E
Contract NAS3-4162
NASACR-54090

Descriptors: *Electric conductor, *Electric insulation, *Magnetic material, *Material testing, *Spacecraft power supply.

AD-471 247 **See Field 11F**

AD-634 826 **See Field 9A**

AD-634 827 **See Field 11F**

AD-634 828 **See Field 9A**

AD-634 861 **See Field 9A**

AD-634 862 **See Field 9A**

AD-634 909 See Field 11C

AD-634 975 See Field 9A

AD-635 118 See Field 9A

AD-635 123 See Field 9E

AD-635 128 See Field 9A

AD-635 129 See Field 9A

AD-635 143 See Field 9E

AD-635 183 See Field 9A

AD-635 249 See Field 11F

AD-635 368 See Field 11F

AD-635 381 See Field 11F

AD-635 465 See Field 11H

AD-635 466 See Field 11F

AD-635 471 See Field 20A

AD-635 472 See Field 9E

AD-635 478 See Field 11F

AD-635 480 See Field 9A

AD-635 482 See Field 19D

AD-635 495 See Field 20B

AD-635 498 See Field 9A

PB-169 801 See Field 11F

PB-170 357 See Field 11L

13I. MACHINERY AND TOOLS

AD-634 981 Field 13I

CFSTI Prices: HC$1.00 MF$0.50
Marine Corps. Landing Force Development Center, Quantico, Va.
IMPROVEMENT AND MODERNIZATION OF UTILITIES TOOLS.
Final rept. for 1 Oct 65.
by P. J. Fontana. 23 Jun 66, 9p
Task LO-01-65

Descriptors: (*Tool kits, Maintenance equipment), Electrical equipment, Refrigeration systems, Pipes, Small tools, Corrections.

Current utility tool kits were evaluated to determine the type and quantities of applicable hand tools required to improve and modernize the kits. Recommended changes are listed for the following kits: Lineman's/electrician's, refrigeration service, and pipefitter's.

AD-635 280 Field 13I, 21E, 20M

CFSTI Prices: HC$4.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
CALCULATION OF THERMAL CONDITIONS OF ROLLER BEARINGS OF GAS-TURBINE ENGINES.
by V. M. Demidovich. 17 Jan 66, 18p FTD-MT-65-32
TT-66-61690
Edited machine trans. of Aviatsionnyi Institut, Kazan. Trudy (USSR) v66 p49-62 1961.

Descriptors: (*Roller bearing, Gas turbines), USSR, Thermodynamics, Lubrication, Performance (Engineering).

The method of thermal calculation of GTE roller bearings permits solving of the problem, important for practice, of calculating the necessary magnitude of circulation of oil through housings of bearings, which ensures operation of the latter at assigned operating temperature, which increases reliability and long service life of their operation. (Author)

N66-15364 Field 13I

CFSTI Prices: HC$5.00 MF$1.25
Martin Co., Baltimore, Md.
LUNAR ROCK CORING DEVICE DESIGN STUDY.
Final rept.
by D. S. Crouch. Oct 65, 197p ER-13952
Contract NAS9-3542
NASA-CR-65188

Descriptors: *Lunar surface, *Rock, *Sampling device, *Drill.

For abstract, see T 66 16.

N66-15366 Field 13I

CFSTI Prices: HC$4.00 MF$1.00
SKF Industries, Inc., King of Prussia, Pa. Research Lab.
SUPERSONIC TRANSPORT LUBRICATION SYSTEM INVESTIGATION.
Semiannual rept. no. 2.
by C. G. Hingley, and L. B. Sibley. 20 Nov 65, 125p SKF-AL65T077
Contract NAS3-6267
NASA-CR-54312

Descriptors: *Supersonic transport, *Aircraft engine, *Ball bearing, *Gas turbine, *Lubricating oil, *Lubrication system.

N66-15374 Field 13I

CFSTI Prices: HC$6.00 MF$1.25
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
MATERIALS FOR POTASSIUM LUBRICATED JOURNAL BEARINGS.
Quarterly progress rept. no. 8, 22 Jan-22 Apr 65.
by R. G. Frank. 1965, 221p
Contract NAS3-2534
NASA-CR-54646

Descriptors: *Journal bearing, *Material testing, *Rotating shaft, *Turbogenerator.

SC-M-66-8 Field 13I, 9B

CFSTI Prices: HC$6.00 MF$1.25
Sandia Corp., Albuquerque, N. Mex.
APT TRAINING PROGRAM. A PROGRAMMED TEXTBOOK.
by R. O. Dell. Apr 66, 269p
See also SC-M-66-8A.

Descriptors: (*Machine tools, Control systems), Automatic, Programming (Computers), Computers, Training, Textbooks, Cutting tools, Programmed instruction.

Identifiers: Automatically programmed tools.

The initials 'APT' stand for Automatically Programmed Tools. They refer to a system for preparing instructions for numerically controlled machine tools. This system translates a designer's intentions (expressed in words) into machine tool instructions (expressed in numbers). The designer expresses his intentions by using the APT language. The actual translation process is carried out by a computer. Since a single APT statement containing only a few words is often translated into a dozen or more numerical machine commands, the task of preparing a set of machine commands by using APT is much easier than the task of preparing them directly in machine language. The APT system has been designed so that the computer does most of the work. The input to the system is a part program manuscript, written by the designer in the APT language. The output is a punched or magnetic tape which contains all the necessary numerical commands. This tape can be mounted on the control unit of the machine tool. (Author)

SC-M-66-8A Field 13I, 9B

CFSTI Prices: HC$1.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
ANSWER BOOKLET FOR APT TRAINING PROGRAM.
Apr 66, 25p
See also SC-M-66-8.

Descriptors: (*Machine tools, Control systems), Automatic, Programming (Computers), Computers, Training, Textbooks, Cutting tools, Programmed instruction.

Identifiers: Automatically Programmed Tools.

AD-635 278 See Field 11F

NAA-SR-11202 See Field 14B

PB-170 345 See Field 1C

PB-170 347 See Field 14B

PB-170 348 See Field 13D

13J. MARINE ENGINEERING

AD-634 996 Field 13J

CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C.
UNDERWAY VIBRATION SURVEY ON THE USS OKINAWA (LPH-3). A CASE STUDY OF SUPERSTRUCTURE VIBRATION.
Final rept.
by Donald C. Robinson. Apr 66, 38p Rept. no. 2161

Descriptors: (*Aircraft carriers, Amphibious operations), (*Naval vessels (Support), Amphibious operations), (*Vibration, Naval vessels (Support)), Ship structural components, Frequency, Ship hulls, Marine propulsion, Tests, Electronic equipment.

Identifiers: LPH-3.

An underway vibration survey was performed on USS OKINAWA (LPH-3) to establish critical frequencies and determine maximum vibratory levels of the hull, island, radar mast, main propulsion machinery, and Mark 63 Director 2. Free route (straight course) steady-speed runs were made in addition to hard turns, crashback maneuvers, and anchor drop tests. Large magnifications of athwartship vibration motion of the island-radar mast structure relative to the hull were noted for speeds above 85 rpm. The superstructure of OKINAWA influences the island and radar mast vibrations whose levels are important for the successful operation of electronic equipment mounted on these structures. Because of the characteristics of the superstructure, the ratio of the higher flexural hull frequencies to the fundamental frequency differs from that found on a number of other class vessels. (Author)

AD-635 141 Field 13J, 20K

CFSTI Prices: HC$3.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
TESTS OF FABRICATED MULTILAYERED RING-STIFFENED CYLINDRICAL MODELS UNDER EXTERNAL HYDROSTATIC PRESSURE.
by Richard V. Raetz. Apr 66, 31p
Proj. S-R011-01-01
Task 0401
DTMB-2173

Descriptors: (*Structural shells, Hydrostatic pressure), (*Stiffened cylinders, Hydrostatic pressure), (*Submarine hulls, Design), Model tests, Rings, Sandwich construction, Steel, Buckling (Mechanics), Stresses.

Identifiers: Steel HY-100.

An exploratory investigation was carried out to study the strength of ring-stiffened multilayered cylindrical shells under external hydrostatic pressure. Four HY-100 steel models, having relatively large shell thickness-to-diameter ratios, were tested to collapse. The weight-to-displacement ratios for all models were approximately equal. The tests indicated that for the weight-to-displacement ratio studied, the strength of a single-layered ring-stiffened cylindrical model could be attained by a model with a shell consisting of two layers, each layer one-half the single-layered shell thickness, with a moderate increase in shell yield strength. It was also indicated that the strength of the single-layered model could not be attained in a model with a shell consisting of layers of one-fourth the single-layered shell thickness without a very large increase in the yield strength of both shell and frame material. (Author)

AD-635 148 **Field 13J, 11F**
CFSTI Prices: HC$1.50 MF$1.00
Illinois Univ., Urbana. Coll. of Engineering.
CLEAVAGE FRACTURE OF SHIP PLATES AS INFLUENCED BY SIZE EFFECT.
Final rept.
by W. M. Wilson, R. A. Hechtman, and W. H. Bruckner. 12 Jun 47, 164p
Contracts NObs-31224, NObs-34231
Proj. SR-93
SSC-10
Previously announced as PB-78748, 27 Oct 47, Lcmi $4.00 ph $12.00. See also AD-635 109.

Descriptors: (*Ship plates, *Fracture (Mechanics)), Notch toughness, Steel, Experimental data, Transition temperature, Impact tests.

The report contains a description of tests made to determine why ship plates crack in service. The tests were based upon the hypothesis that the cracks begin at points where there are severe geometrical stress-raisers and that the tendency for the plates to crack increases, for specified geometrical characteristics, with an increase in the notch-sensitivity of the steel. Plates with nominal widths of 72, 48, 24 and 12 inches were tested. The tests were planned to determine: (1) The relative energy-absorbing capacity and strength of plates of the six kinds of steel. (2) The relation between the width of the plates and their strength. (3) The relation between the temperature of the plates and their strength and energy-absorbing capacity. (4) The relation between the type of fracture and energy-absorbing capacity of the plates. (5) The correlation of the V-notch impact test and the wide plate test.

AD-635 521 **Field 13J, 8A, 8J, 14B K**
CFSTI Prices: HC$3.00 MF$0.50
Narragansett Marine Lab. Univ. of Rhode Island, Kingston.
THE RESEARCH SUBMARINE ASHERAH: AN ORIENTATION PROGRAM AND ITS APPRAISAL.
Technical rept.
by R. L. McMaster, J. T. Conover, D. C. Krause, L. E. Garrison, and A. L. Brooks. May 66, 36p
TR-1
Contract Nonr-396 (08)
Proj. NR-083-165

Descriptors: (*Submarines, *Oceanographic vessels), Operation, Oceanology, Block Island sound, Narragansett bay.

Identifiers: Asherah.

A two-man research submarine, the Star II (Asherah), of General Dynamics Corporation was used for underwater trails and scientific investigations in Rhode Island coastal waters during a two-week period in June 1965. A detailed appraisal of the scientific operational, and vehicle aspects of this underwater endeavor is presented by the scientific participants. (Author)

AD-634 803 **See Field 11C**

AD-635 079 **See Field 14C**

AD-635 107 **See Field 11F**

AD-635 108 **See Field 11F**

AD-635 109 **See Field 11F**

AD-635 149 **See Field 11F**

AD-635 171 **See Field 13E**

AD-635 172 **See Field 11F**

AD-635 181 **See Field 13E**

AD-635 182 **See Field 11F**

AD-635 243 **See Field 15E**

AD-635 368 **See Field 11F**

AD-635 464 **See Field 20D**

PB-169 801 **See Field 11F**

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

AD-635 267 **See Field 20L**

13L. SAFETY ENGINEERING

AD-635 250 **See Field 15F**

AD-635 492 **See Field 15F**

13M. STRUCTURAL ENGINEERING

AD-634 852 **Field 13M, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
TECHNIQUES FOR TESTING STRUCTURES PERMITTED TO SWAY.
Summary rept. for 1964-1965.
by Erol Yarimci, Joseph A. Yura, and Le-Wu Lu. May 66, 52p Fritz-273.40
Contracts NObs-94092, NBy-53160
Rept. on Plastic Design of Multi-Story Frames.

Descriptors: (*Flexible structures, Test methods), Test equipment, Simulators, Gravity, Loading (Mechanics), Buildings, Supports, Plasticity, Structural parts.

Mechanisms are described that eliminate the restraining effects of the loads and the lateral bracing on test specimens permitted to sway. One mechanism, called the gravity-load simulator, maintains a vertical orientation of load even as a structure sways. The lateral bracing mechanism presented does not restrain a test structure at large deflections yet does not require any adjustments when the test specimen deflects. A gravity-load simulator and a lateral bracing system designed for use in testing full-size building frames are presented. Tests on the equipment itself and tests of building frames utilizing the mechanisms show very satisfactory behavior of the gravity-load simulator and the lateral bracing system. Some actual test setups using the mechanisms are described. Tests on three-story full-size building frames (30 ft. high) and a frame buckling test are included. The hydraulic loading system and an electrical gage for measuring rotations that were developed for tests on full-size structures are also presented. (Author)

AD-634 998 **Field 13M, 5K, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Agricultural and Home Economics Experiment Station, Ames. Dept. of Sociology and Anthropology.
ADOPTION OF PUBLIC FALLOUT SHELTERS: A 1966 NATIONAL STUDY.
by Gerald El Klonglan, George M. Beal, Joe M. Bohlen, and Walter Coward Jr. 1966, 44p Rural Sociology-54
Contract OCD-PS-65-9

Descriptors: (*Fallout shelters, Public opinion), (*Adjustment (Psychology), Fallout shelters), Nuclear warfare, Analysis, Sociometrics.

The purpose of the report was to analyze the public's progress in adopting the idea of using public fallout shelters in the event of a nuclear attack. The analytical framework used to guide the analysis was that of individual adoption behavior. The individual adoption process was divided into five stages: Unaware, Aware, Information, Evaluation and Adoption. The adoption process was operationalized by a series of questions designed to determine the extent to which individuals had adopted the idea of using public fallout shelters in case of nuclear attack.

PB-169 931 **Field 13M, 5E**
CFSTI Prices: HC$3.00 MF$0.75
National Swedish Inst. for Building Research, Stockholm.
STUDY OF DIMENSIONS re EQUIPMENT IN HOUSING FOR OLD PERSONS.
by 1965, 61p Rept. no. 19:1965
Sponsored by grant from the Research Fund.

Descriptors: (*Housing, Management planning), (*Human engineering, Housing), (*Aging (Physiology), Humans), Buildings, Measurement, Anthropometry, Positioning reactions, Motion, Kitchen equipment and supplies, Sweden.

The study comprised (a) a field study during the course of which certain facts emerged regarding the physical agility and measurements of a large group of old persons, some of whom were selected as test cases, and (b) laboratory studies when a series of suitable dimensions in respect of household fixtures were adopted for the test cases. The results of these studies have been compared with dimensions currently recommended in Sweden and other countries.

PB-170 498 **Field 13M, 13B**
CFSTI Prices: HC$5.00 MF$1.00
California State Div. of Highways.
STRUCTURAL BEHAVIOR OF A BOX GIRDER BRIDGE.
by R. E. Davis, J. J. Kozak, and C. F. Scheffey. May 65, 169p Rept. no. 0463
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and California Univ., Berkeley.

Descriptors: (*Box beams, Bridges), (*Bridges, Box beams), (*Civil engineering, Bridges), (*Statics, Bridges), Structural properties, Loading (Mechanics), Load distribution, Cargo vehicles.

Identifiers: Box girder bridge.

The report presents the results of a moving load field test of an 80 foot, simple span, reinforced concrete box girder structure. The bridge was instrumented with strain and deflection gages and tested with a dump truck (gross weight of 57 kips) at various speeds and lateral positions. The primary objective of the study was to obtain information on the transverse distribution of live loads; secondary objectives involved the determination of dead load distribution, influence of intermediate diaphragms and influence of barrier curbs. Experimental results were compared with three analytical methods of calculating load distribution. Some of the conclusions stated were: (1) Dead load deflections measured in the field checked closely those compiled theoretically; (2) live load distribution without a diaphragm indicated about 15 percent

greater transverse distribution than allowed in the 1961 AASHO Bridge Specifications; (3) addition of a midspan diaphragm resulted in very small changes; (4) addition of curbs and railings resulted in a large increase of total section stiffness; (5) only one of the analytical methods agreed closely with experimental results. A separate volume of the report contains appendices which detail the data reduction, materials control tests, and the analytical methods. (Author)

AD-635 501 See Field 15C

AD-635 502 See Field 15C

PB-169 932 See Field 20K

14A. COST EFFECTIVENESS

AD-635 117 **Field 14A, 5A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ON THE COST-EFFECTIVENESS APPROACH TO MILITARY R AND D: A CRITIQUE.
by Klaus Knorr. Jun 66, 11p P-3390
Prepared for the National Meeting of the Operations Research Society of America (29th), in Santa Monica, May 1966.

Descriptors: (*Armed forces research, *Cost effectiveness), Costs, Optimization, Decision making, Management engineering, Military psychology.

The paper presents the main limitations and hazards of the cost-effectiveness approach to clarifying choices in the military area in general, then develops some aspects of the management problem raised by these limitations and hazards, and finally reviews these problems with special reference to R and D decisions.

AD-635 168 **Field 14A, 15E, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Abedfeen Proving Ground, Md.
COST-EFFECTIVENESS ANALYSES.
by Daniel D. O'Neill, Dean P. Westerman, and William Sacco. Mar 66, 48p BRL-R-1315
Proj. RDT/E-1P523801A098

Descriptors: (*Weapon systems, *Cost effectiveness), Linear programming, Target acquisition, Military requirements.

Methods for the conduct of cost-effectiveness studies and formats for the presentation of results are presented. (Author)

N66-15368 **Field 14A**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Corp., Covina, Calif. Aetron Div.
ECONOMIC ANALYSIS OF PERLITE VERSUS SUPER INSULATION IN LIQUID HYDROGEN STORAGE AND RUN VESSELS FOR THE M-1 PROGRAM.
by J. C. Commander, and L. L. Rotter. 15 Oct 65, 33p AGC-8800-13
Contract NAS3-2555
NASA-CR-54720

Descriptors: *Cryogenic storage, *Liquid hydrogen, *Thermal insulation, *Dewar system, *M-1 rocket engine.

For abstract, see T 66 16.

PB-169 878 **Field 14A, 5C**
CFSTI Prices: HC$9.60 MF$0.75
Systems Analysis and Research Corp., Cambridge, Mass.
FEASIBILITY OF DEVELOPING DOLLAR VALUES FOR INCREMENTS OF TIME SAVED BY AIR TRAVELERS.
by Herbert E. Bixler, and James R. Nelson. Feb 66, 98p XG-351-66
Contract FA-65-WA-1321

Descriptors: (*Air transportation, Cost effectiveness), (*Cost effectiveness, Air transportation), Feasibility studies, Time, Reduction, Costs, Money, Population, Air traffic control systems.

The purpose of the project is to conduct economic and statistical research in accordance with generally accepted economic principles to determine the feasibility and worth to the Federal Aviation Agency of developing a series o averages of, or formulae for computing, the dollar values of increments of time saved by populations of air travelers as a result of improvements being made to the Air Traffic Control and Navigation (ATCN) and public airport systems in the United States by the FAA.

PB-170 486 See Field 13B

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-634 783 **Field 14B, 20A**
CFSTI Prices: HC$5.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ACOUSTICAL REDESIGN OF THE FOREST GROVE BURNER LABORATORY,
by C. J. T. Young, and W. B. Snow. Nov 49, 60p Bumblebee-105
Contract NOrd-7386

Descriptors: (*Test facilities, *Combustion), (*Acoustics, Test facilities), Blast, Noise, Attenuation, Design.

The report describes the design used in reconstructing the Forest Grove Burner Laboratory for quieter operation. It reviews the technology available and describes the design evolved for achieving the desired results. Briefly, the reconstructed unit of the establishment consists of a double-walled concrete burner cubicle with sound-insulating doors and windows, an air intake stack rising from one end, and an exhaust stack from the other. In both stacks, sound attenuation is accomplished chiefly by panels of rock wool in perforated steel that divide the stacks into ducts a few inches wide. The intake stacks are entirely new, and the exhaust stacks are modifications of those already present. On the basis of a detailed analysis, it is predicted that sound escaping by any route will not exceed the allowed level of 90 decibels outside the building. A qualitative report on actual performance, indicating that satisfactory results have been achieved, is included.

AD-634 796 **Field 14B, 9A**
CFSTI Prices: HC$2.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
METHOD OF DESIGNING CURRENT PICK-OFFS FOR GYRO POTENTIOMETERS,
by V. Yu. Shishmarev, L. I. Zakharova, and Z. F. Urazaev. Jun 66, 40p FSTC-HT-23-113-66
Proj. 2301-6553
TT-66-61578
Trans. of Tekhnologiya i Konstruirovanie Giroproborov (USSR) n59 1964.

Descriptors: (*Potentiometers, Gyroscopes), USSR, Electric connectors, Optimization, Reliability (Electronics), Stresses, Design, Deflection, Alloys.

A methodology is presented for the design of potentiometer pickoffs for gyro instruments to prevent loss of contact under vibrational loadings and to minimize contact and winding wear. Equations and graphical solutions are presented for cantilever brush supports using various materials. (Author)

AD-634 874 **Field 14B, 20L**
CFSTI Prices: HC$1.50 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash.
DETERMINATION OF INTERATOMIC DISTANCES FROM X-RAY ABSORPTION FINE STRUCTURE.
by Farrel W. Lytle. Apr 66, 30p D1-82-0524
Presented at the Annual Conference on Applications of X-Ray Analysis, Denver, Colo, 27 Aug 65.

Descriptors: (*X-Ray spectroscopy, Hyperfine structure), (*Crystal lattices, X-Ray spectroscopy), Absorption spectrum, Atomic properties, Glass, Liquids, Gases.

A particle-in-a-box approximation to the problem of x-ray absorption fine structure has been successful in predicting many features of the effect. The theory successfully accounts for the extended fine structure observed on any x-ray absorption edge in crystalline and amorphous solids, liquids and gases. A simple data analysis technique was developed by which the absorption fine structure can be 'indexed' and atomic distances calculated. Examples are given for crystalline, amorphous, and gaseous materials. (Author)

AD-634 904 **Field 14B, 20A**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
DESIGN AND PERFORMANCE OF A 15 KW WIDE BAND ACOUSTIC FACILITY.
Final technical rept., Nov 60-Jun 64,
by Keith M. Hankel, and John P. Henderson. Mar 66, 63p AFFDL-TR-66-8
Projs. AF-1309, AF-4437
Tasks 130901, 443705

Descriptors: (*Sound generators, Broadband), (*Test facilities, *Acoustics), Sound Performance (Engineering), Design, Frequency modulation, Acoustic horns, Pressure.

Details of the design and performance of a wide band, high intensity, acoustic test facility are presented. The wide band siren, horn network, sound isolation room, noise measurement and analysis instrumentation, input power requirements, and measured performance characteristics of the facility are described. The problem of the presence of several discrete frequency peaks in the spectrum of the original siren configuration is discussed along with techniques which were investigated to improve the spectrum. Frequency modulation of the rotor speeds is shown to result in a relatively smooth, continuous random spectrum. The limited spectrum shaping capabilities of the siren are discussed. Recommendations are made for improvements that could be incorporated into future designs of sirens of this type. (Author)

AD-635 040 **Field 14B, 7D**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN, CONSTRUCTION AND TESTING OF A MOSSBAUER SPECTROMETER.
Master's thesis.
by Patrick James O'Toole. Jun 66, 104p GSP/PH/66-14

Descriptors: (*Spectrum analyzers, Mossbauer effect), Design, Calibration, Performance (Engineering), Construction.

The purpose of this project was the construction and testing of an electromechanical Mossbauer spectrometer with constant acceleration mode of operation. Design of the spectrometer is based on the original plan of the National Bureau of Standards. The spectrometer is designed for use in both research and education. Velocity calibration of the spectrometer was obtained by use of a voltage-to-frequency converter, a multichannel analyzer and an Fe (57) absorption spectrum. In the range checked, the linearity of the system is 0.10%. Sample results obtained from Fe (57) source-absorber

combinations are presented. The results indicate agreement to within plus or minus 5% of values in the literature. (Author)

AD-635 101 **Field 14B, 17B**
CFSTI Prices: HC$1.00 MF$0.50
Electro-Metrics Corp., Amsterdam, N. J.
ACCESSORY EQUIPMENT FOR RADIO FREQUENCY COMPATIBILITY MEASUREMENTS.
Final technical rept. no. 12, 23 Jun 64-9 May 66.
by R. F. Schlieman. Jun 66, 14p
Contract DA-28-043-AMC-00218 (E)
Proj. DA-1E6-20501-D-449-01-11
ECOM-00218 (F)

Descriptors: (*Measuring devices (Electrical + electronic), *Radiofrequency), Compatibility, Microwave equipment, Frequency meters.

This is the final report on a project resulting in a compatible group of r-f accessory equipment for r-f compatibility measurements. This equipment includes commercial attenuators, isolators, directional couplers, signal samplers, and a frequency measuring system (10 Hz to 40 GHz). It also includes a set of five notch filters (14 Hz to 1 GHz), a Standard Response Indicator (for measuring (S+N)/N ratios), and a wide-range deviation monitor (which operates between 1 and 40 GHz). (Author)

AD-635 156 **Field 14B, 20D**
CFSTI Prices: HC$6.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
FLOW CHARACTERISTICS OF THE BALLISTIC RESEARCH LABORATORIES' SUPERSONIC WIND TUNNEL NO. 1.
Memorandum rept.
by Clarence C. Bush. Feb 66, 52p BRL-MR-1731
Proj. RDT/E-1A222901A201

Descriptors: (*Supersonic wind tunnels, Operation), Fluid flow, Calibration, Instrumentation, Supersonic nozzles, Wind tunnel nozzles.

The Ballistic Research Laboratories' Supersonic Wind Tunnel No. 1 flow characteristics are presented in detail to assist those who may wish to make use of the facility. Techniques and instrumentation used in calibrating supersonic nozzles for Mach number and flow direction distributions are discussed, as well as nozzle adjustment procedures used to improve the flow in the testing region for nozzles with flexible walls. (Author)

AD-635 210 **Field 14B, 8F**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ORIGIN AND EARLY UTILIZATION OF AIRCRAFT-SUPPORTED DRIFTING STATIONS.
by J. O. Fletcher. Jun 66, 24p P-3395
Presented at the Symposium on Arctic Drifting Stations, Arlie Conference Center, Virginia, Apr 12-15, 1966.

Descriptors: (*Arctic regions, *Weather stations), Research planes, Ice islands, Laboratories, Logistics, State-of-the-art reviews, Symposia.

The paper outlines the pioneering efforts to utilize aircraft and drifting stations for research in the Arctic Basin, from 1879 to the beginning of the International Geophysical Year in 1957. (Author)

AD-635 305 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Frank J. Seiler Research Lab., Air Force Academy, Colo.
DESIGN, CONSTRUCTION, AND CALIBRATION OF THE FJSRL 17-INCH LOW DENSITY SHOCK TUBE.
Scientific rept.
by Charles F. Stebbins, and Douglas S. Johnson. May 66, 46p SRL-66-0006
Proj. AF-7905
Task 790500

Descriptors: (*Shock tubes, Performance (Engineering)), Gases, Superaerodynamics, Shock waves, Deceleration, Design, Construction, Calibration, Argon.

Identifiers: Free molecular flow.

The tube is to be used for studying real gas phenomena in a real shock tube. The FJSRL shock tube can be fired at test pressures ranging from 1/2 micron Hg up to atmospheric pressure, with multi-test and multi-driver gas capabilities. Diaphragm pressure ratios range between 100,000 and 10 to the 8th power giving a practical range of Mach numbers, in argon, of $2 < Ms < 10$. The Mach number repeatability of the tube is to within approximately 0.5%. The shock wave was shown to decelerate only 0.1%/ft near the test section endwall for the full tube operating range, guaranteeing an essentially constant Mach number over models or instruments of reasonable length. The tube has excellent integrity as a vacuum vessel with a leak rate of < .01 micron/hour. (Author)

AD-635 530 **Field 14B, 20A, 17A**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
AN IMAGE-SUPERPOSITION TECHNIQUE FOR MEASURING TIME BETWEEN ULTRASONIC ECHOES.
Technical rept.
by Anthony G. Martin. May 66, 17p
Proj. DA-1C024401A330
AMRA-TR-66-18

Descriptors: (*Time-interval counters, *Echo ranging), (*Ultrasonic radiation, Echo ranging), Test methods, Optical images, Oscilloscopes, Timing circuits, Digital systems, Frequency meters.

An image-superposition technique has been developed for accurately measuring the time interval between two ultrasonic echoes. The measurement is made by alternately shifting displayed images of the echoes so that the images are superposed. The amount of shifting is controlled by digital circuitry in such a way that the time interval is the inverse of the frequency of a recurrent square wave. This frequency is measured very accurately by a frequency counter. The accuracy of the final results is limited mainly by the properties of the specimen and ultrasonic apparatus, and by the characteristics of ultrasonic pulses. Including the effects of these factors, measurements are accurate to within a few tenths of a percent. (Author)

NAA-SR-11202 **Field 14B, 18I, 13I**
CFSTI Prices: HC$3.00 MF$0.75
Atomics International, Canoga Park, Calif.
CALANDRIA REMOTE MAINTENANCE TOOL DEVELOPMENT.
by L. Newcomb. 15 Apr 66, 86p
Contract AT (11-1)-GEN-8

Descriptors: (*Graphite moderated reactors, Maintenance equipment), (*Machine tools, Remote control systems).

For abstract, see N 20 14.

NBS-TN-286 **Field 14B, 7D, 11F**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Washington, D. C. Spectrochemical Analysis Section.
SPARK SOURCE MASS SPECTROGRAPH PROGRAM JULY 1964 TO JUNE 1965.
by Paul J. Paulsen, and Paul E. Branch. 15 Apr 66, 25p
Available from the Superintendent of Documents, GPO, Washington, D. C. 20402, HC$0.25, as C-13.46:286.

Descriptors: (*Mass spectroscopy, Reviews), Sparks, Instrumentation, Spectrum analyzers, Chemical analysis, Ion sources, Ionization gages, Oxygen, Isotopes, Aluminum compounds, Oxides, Brass, Tin.

Identifiers: Aluminum oxides, Spark source mass spectrographs.

The report describes the activities of the spark source mass spectrograph project for the period from July 1964 through June 1965. The subjects covered include instrument modifications which resulted in lower backgrounds, modifications planned for the near future, an outline of the procedure used in an analysis, a description of data computation techniques, and experimental results obtained for some NBS standard reference materials. Photographs of the instrument with its modifications as well as photographs of the improved mass spectrum are also included. (Author)

N66-16068 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
National Research Corp., Cambridge, Mass.
STUDY OF DENSITY CALIBRATION IN SPACE.
Final rept. 18 Jun 64-18 Aug 65.
by F. J. Brock, and F. Feakes. Nov 65, 33p
Contract NAS5-3959
NASA-CR-69692

Descriptors: *Calibration, *Mass spectrometer, *Pressure gauge, *Satellite.

N66-16559 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
CALIBRATION EXPERIENCE IN THE LANGLEY HOTSHOT TUNNEL FOR MACH NUMBERS FROM 12 TO 26.
by T. R. Creel Jr, F. M. Smith, and C. G. Miller III. Feb 66, 48p NASA-TN-D-3278

Descriptors: *Flow characteristics, *Arc chamber, *Rocket nozzle.

N66-16573 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FORCE MEASUREMENT IN A VACUUM ENVIRONMENT BELOW 10-6 TORR.
by D. C. Glenn. Feb 66, 10p NASA-TM-X-1209

Descriptors: *Roller bearing, *Torque measuring apparatus, *Vacuum, *Force, *Transducer.

N66-16936 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
A SOFT X-RAY PHOTOIONIZATION DETECTOR.
by A. K. Stober, and R. M. Young. Feb 66, 13p
NASA-TN-D-3169

Descriptors: *Solar radiation observation, *Ionization chamber, *Radiation detector, *Solar X-ray.

N66-18018 **Field 14B**
CFSTI Prices: HC$3.00 MF$0.75
Bell Aerosystems Co., Buffalo, N. Y.
DEVELOPMENT OF A MINIATURE ELECTROSTATIC ACCELEROMETER (MESA) FOR LOW G APPLICATIONS.
Summary rept.
by E. J. Harrison, M. A. Meldrum, and Z. Milburn. 30 Apr 65, 65p BAC-60009-509
Contract NAS3-4102
NASACR-54137

Descriptors: *Accelerometer, *Electrostatic instrument, *Measuring apparatus, *Miniature electronic equipment, *Digital transducer.

PB-170 211 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
SSCO Standards Lab., Inc., Southfield, Mich.
TWO PHASE OSCILLATOR; MODEL 1443 (COMMUNICATION MEASUREMENTS LABORATORY, INC.).
Technical manual; instrument calibration procedure, AG-77.
1 Feb 66, 12p
Contract N123 (62861)35059A
NAVWEPS-17-20AG-77
Supersedes PB-168 582, NAVWEPS 17-20AG-77 dated 15 June 1965.

Descriptors: (*Test equipment (Electronics), Calibration), (*Oscilloscopes, Calibration), Signal generators, Voltage, Frequency, Phase distortion, Stability, Test methods, Instruction manuals.

Identifiers: 1443 Oscillators.

The procedure describes the calibration of the Communication Measurements Laboratory, Inc., Model 1443, Two Phase Oscillator. The Oscillator covers the frequency range from 17 to 6000 cps in five bands, and delivers a two phase signal with a displacement of 90 degrees.

PB-170 212 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Milmanco Corp., Renton, Wash.
IMPEDANCE BRIDGE MODEL 1650-A (GENERAL RADIO).
Technical manual instrument calibration procedure, AZ-24.
1 Feb 66, 13p
Contract N123 (62861)5 1295A
NAVWEPS-17-20AZ-24
Supersedes PB-168 693, NAVWEPS 17-20AZ-24 dated 15 Jul 65.

Descriptors: (*Test equipment (Electronics), Calibration), (*Impedance bridges, Calibration), Frequency, Resistance (Electrical), Capacitance, Inductance, Test methods, Instruction manuals.

Identifiers: 1650 Impedance bridges.

The procedure describes the calibration of the General Radio 1650-A impedance bridge. The test instrument measures the inductance and storage factor of inductors, the capacitance and dissipation factor of capacitors, and the ac and dc resistance of all types of resistors. (Author)

PB-170 347 **Field 14B, 13I, 5C**
CFSTI Prices: HC$2.00 MF$0.50
Norris and Elliott, S. A. de C. V., Mexico City.
THE INDUSTRIAL INSTRUMENTATION MARKET IN MEXICO.
by Charles R. Quich. Dec 65, 44p
Prepared in cooperation with Business and Defense Services Administration, Dept. of Commerce, Washington, D. C. Prepared for presentation at U. S. Industrial Equipment Exhibition, Mexico City, August 1-13, 1966.

Descriptors: (*Instrumentation, Industries), (*Industries, Instrumentation), (*Mexico, Commerce), Computers, Quality control, Measurement, Thermometers, Meters, Pressure gages, Contol systems, United States.

Conculsions: There is an attractive market in Mexico for United States Instrument Manufacturers. The present annual sales of the types of instruments covered by this survey - amounting to approximately 15 million dollars - should increase 80 to 100% in the next five years. U.S. manufacturers presently supply approximately 75% of Mexico's instrument equirements, but are being pressed by European suppliers. There is a small, but rapidly expanding, instrument industry in Mexico which is being aided and protected by the Mexican Government, primarily dedicated to the industrial process control field. Mexican industry today recognizes the need of better quality control, in order to meet the high competitive standards of both the export field and its own growing domestic market. The wide variety of products and relatively small production runs inherent to Mexico's industry places greater emphasis on laboratory and testing instruments. In the field of laboratory and testing instruments there is a lack of manufacturing interest. The wide assortment of instruments required by Mexican industries make this field a prime market for United States manufacturers of these instruments. (Author)

AD-450 189 **See Field 9C**

AD-461 260 **See Field 20D**

AD-462 001 **See Field 5A**

AD-463 208 **See Field 22A**

AD-634 781 **See Field 20D**

AD-634 801 **See Field 17B**

AD-634 802 **See Field 19D**

AD-634 852 **See Field 13M**

AD-634 863 **See Field 9F**

AD-634 908 **See Field 13F**

AD-634 975 **See Field 9A**

AD-634 977 **See Field 21E**

AD-635 105 **See Field 9F**

AD-635 174 **See Field 7D**

AD-635 226 **See Field 20I**

AD-635 286 **See Field 9E**

AD-635 521 **See Field 13J**

PB-170 355 **See Field 7D**

14C. RECORDING DEVICES

AD-635 079 **Field 14C, 13J**
CFSTI Prices: HC$0.75 MF$0.50
Lessells and Associates, Inc., Boston, Mass.
AN UNMANNED SYSTEM FOR RECORDING STRESSES AND ACCELERATIONS ON SHIPS AT SEA.
Progress rept.
by D. J. Fritch, and F. C. Bailey. 3 Jun 63, 29p
PR-1
Contracts NObs-77139, NObs-84321
Proj. SR-153
SSC-150
Previously announced as PB-181 504 HC$0.75.

Descriptors: (*Ships, Mechanics), (*Magnetic recording systems, Shipborne), Stresses, Acceleration, Statistical data, Hydrodynamics, Moments, Loading (Mechanics).

In order to obtain long-term statistical data on wave-induced bending moments, two dry-cargo ships have been equipped with stress transducers and automatic magnetic-tape recording instrumentation. One of these ships has also been equipped with accelerometers to provide information on seaway-induced loads on cargo. The transducers and their installation are described, as well as the data conditioning units, the tape recorder, and the programmer which allows sampling of the data at preselected intervals and continuous recording when pre- set stress levels are exceeded. The system has performed beyond expectation; data have been obtained on 36 round-trip voyages representing almost three ship-years of operation. Versatility of the unit in handling a variety of data inputs and adapting to various data reduction methods has been demonstrated. In addition, the data tapes are available for future analysis in a broad spectrum of naval design applications. Experience gained to date will permit future installations to be handled expeditiously and at minimum expense, with a high degree of reliability of the unit assured in service. (Author)

N66-15809 **Field 14C**
CFSTI Prices: HC$4.00 MF$0.75
Kinelogic Corp., Pasadena, Calif.
TAPE RECORDER-REPRODUCER MECHANISM-WORST-CASE ANALYSIS.
Final rept.
by G. Barr, R. Bruns, I. Karsh, and J. Lueder. Oct 65, 110p
Contract NAS7-100
NASA-CR-69563

Descriptors: *Systems design, *Tape recorder, *Functional analysis, *Mathematical model.

For abstract, see T 66 16.

PB-169 874 **See Field 4A**

14D. RELIABILITY

AD-462 482 **Field 14D**
CFSTI Price: HC$1.60
Washington Univ., Seattle. Lab. of Statistical Research.
THEORY OF RELIABILITY FOR COHERENT STRUCTURES,
by Z. W. Birnbaum. 20 Apr 65, 18p Technical rept. TR-41
Contract Nonr-477 (11)

Descriptors: (*Systems engineering, Reliability), (*Reliability, Systems engineering), Mathematical analysis.

With the advent of very complex engineering designs such as those of high-speed computers or supersonic aircraft, it has become increasingly important to study the relationship between the functioning and failure of single components and the performance of the entire system. It is the aim of this paper to present, with complete proofs, some aspects of a mathematical theory dealing with such problems. It is assumed that there are only two states possible for every component of a system, as well as for the system itself: either it functions or it fails. When the system consists of n components, to each of them is ascribed a binary variable which indicates its state; similarly to the entire system is ascribed a binary indicator variable. When the design of a system is known, then the states of all n components determine the state of the system. It is furthermore assumed that the state of each component is decided by chance, so that the value actually assumed by the state variable is a binary random variable with the probability distribution; these random variables are totally independent.

AD-634 980 **Field 14D, 1C, 12B**
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
SOME STATISTICAL ASPECTS OF THE DETERMINATION OF A SAFE LIFE FROM FATIGUE DATA.
by Sam C. Saunders. Apr 66, 26p D1-82-0515, Mathematical note-455

Descriptors: (*Failure (Mechanics), Probability), Operations research, Life expectancy, Reliability, Fatigue (Mechanics), Aircraft, Structural parts.

The probability that within a future large second sample no failures will occur before the expiration of a safe service life estimated from a small first sample and the probability that the proportion of all future observations failing before the estimated safe service life is smaller than a given proportion, are the two measures of safety that we adopt here. Assuming the logarithm of the fatigue life is normal

with known variance, we derive formulae for these measures of safety. Setting the safe life as some fraction of the mean estimated by the first sample, we then compare the influence of other parameters on these measures of safety. From this assumption it is shown that one has virtually as high an assurance of safety, measured by the first criterion, when using only the minimum of the first sample, as one does by using all the observations in the first sample. If one uses the standard second criterion, namely, the confidence level of a lower tolerance bound, as a measure such an advantage is not retained. (Author)

AD-293 400 See Field 17B

AD-634 991 See Field 17D

AD-635 057 See Field 9B

15A. ANTISUBMARINE WARFARE

AD-471 460 Field 15A
CFSTI Prices: HC$4.00 MF$0.50
RAND Corp., Santa Monica, Calif.
NEW RESULTS IN ASYMPTOTIC CONTROL THEORY.
by R. S. Bucy. Oct 65, 18p RM-4689-PR
Contract AF 49 (638)-700

Descriptors: (*Control systems, Theory), (*Linear systems, Control systems), Differential equations, Matrix algebra, Functional analysis.

A consideration of the control problem for n-dimensional linear systems with loss function that is the sum of a quadratic in the control and a function convex in the state. Using a technique due to Riesz, tha author resolves the asymptotic control problem in this context by functional analytic techniques. (Author)

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

AD-635 256 Field 15B, 6F, 6M, 6E K
CFSTI Prices: HC$6.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
CBE FACTORS: MONTHLY SURVEY NO. 6.
1966, 20p ATD-66-64
Proj. PT-A63002
TT-66-61679
Based on Communist World open source. See also AD-634 099.

Descriptors: (*Chemical warfare agents, Reviews), (*Biological warfare agents, Reviews), Environment, Pesticides, Herbicides, Fertilizers, Ecology, Aerosols, Microorganisms, Soils, Laboratory animals, Nervous system, Toxicity, Viruses, Epidemiology, Meteorological parameters, Abstracts, USSR.

The monthly survey is based on Communist World open sources. It is the sixth in a series of monthly surveys covering the following areas: I. Chemical factors (pesticides, herbicides, fertilizers, psychotomimetics, other chemicals); II. Biological factors (pathogens); III. Environmental factors (aerosols, ecology, micrometeorology, soil science). Available translations of additional sources pertinent to the three subject areas are listed respectively in Appendixes 1-3. There is no bibliography. (Author)

AD-635 119 See Field 7C

15C. DEFENSE

AD-634 925 Field 15C
CFSTI Prices: HC$4.00 MF$1.00
HRB-Singer, Inc., State College, Pa.
POWS EVALUATION SURVEY.
Final rept.,
by P. H. Licastro. 30 Oct 65, 132p Rept. no. 54100-F
Contract OCD-PS-64-41
Also includes Summary.

Descriptors: (*Warning systems, Pyrotechnics), (*Civil defense systems, Warning systems), Flares, Rockets, Smokes, Signals, Smoke generators, PETN, Sound signals, Parachutes, Effectiveness, Rural areas.

A Pyrotechnic Outside Warning System (POWS), consisting of rocket propelled vehicle, sound package, flare, smoke cloud and parachute, was evaluated as an alerting means for remote areas. The evaluation program consisted of three phases. In the procurement/technical evaluation phase tests were conducted with the individual alerting mechanisms, their sequencing and the payload vehicle. The survey phase involved all the necessary tasks for measuring the systems effectiveness as an altering device. A factual, funnel-type questionnaire was desiadministered by face-to-face interviews. In the analysis phase, a computer program was designed to provide the desired device/mechanism effectiveness of POWS as a function of distance from the test site. The results of HRB-Singer's evaluation show that the basic concept of supplementary outside warning through the use of an acoustical signal for gaining popular attention and a visual signal for identification is valid. POWS with its combined sonic and visual indicators could function with a reasonably high degree of reliability for ranges of two and one half miles in rural environments and two miles in suburban environments. (Author)

AD-635 501 Field 15C, 5I, 5J, 13M K
CFSTI Prices: HC$6.00 MF$1.25
Georgia Univ., Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA.
Final rept.
by John A. Hammes. 31 Dec 65, 244p
Contract OCD-PS-65-45
Task 1520

Descriptors: (*Fallout shelters, *Adjustment (Psychology)), (*Civil defense systems, *Personnel management), Training, Confined environments, Civil defense personnel.

From 1962 through 1965 the University of Georgia Civil Defense Research Staff conducted eight simulated community fallout shelter occupancy tests for the Office of Civil Defense. Investigated variables included organizational and environmental factors. Participants were men, women, and children, aged 1-70 years. The last two 300-person tests, conducted in 1965, form the basis for the report. (Author)

AD-635 502 Field 15C, 5I, 5J, 13M K
CFSTI Prices: HC$5.00 MF$1.00
Georgia Univ., Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA (APPENDICES).
31 Dec 65, 198p
Contract OCD-PS-65-45
See also AD-635 501.

Descriptors: (*Fallout shelters, *Adjustment (Psychology)), (*Civil defense systems, *Personnel management), Confined environments, Medical examinations, Tables, Psychometrics.

Contents: Pre-shelter questionnaire data; Medical record data; Structured and unstructured diary data; Environmental data; Shelteree personal possessions data; Emergency operating center program.

AD-457 894 See Field 15G

AD-477 398 See Field 15G

AD-634 901 See Field 8G

AD-634 997 See Field 5J

AD-635 150 See Field 5K

AD-635 187 See Field 15F

15E. LOGISTICS

AD-635 240 Field 15E, 16D, 13F
CFSTI Prices: HC$2.00 MF$0.50
Army Transportation Engineering Agency, Fort Eustis, Va.
PERSHING TRANSPORTABILITY STUDY. CALCULATIONS AND ANALYSIS OF RAILWAY TESTS. VOLUME I.
Engineering rept.
by John H. Grier. Jul 66, 29p USATEA-66-11-Vol-I
See also AD-635 241.

Descriptors: (*Guided missiles (Surface-to-surface), Logistics), (*Railroad cars, Guided missiles (Surface-to-surface)), (*Transportation, Guided missiles (Surface-to-surface)), Shocks (Mechanics), Containers, Second-stage motors, Railroads, Impact tests, Booster motors, Mooring, Loading (Mechanics), Chocks, Cargo, Vibration, Handling.

Identifiers: Pershing, CONUS Railways, M-475 Containers, M-476 Containers.

A stress analysis, based on the test loads imparted to the XM 475 and XM 476 containers in the CONUS railway impact tests, is presented in order to compare the structural adequacy of the two different types of restraining arrangements evaluated in the tests. Results of the stress analysis, which confirmed the test results, demonstrate that the restraining arrangement used on the XM 475 container is structurally adequate and meets the requirements of TB 55-100; whereas, the arrangement used on the XM 476 container is not structurally adequate and does not meet the requirements. Mathematical energy relationships were computed and used as a basis for comparing impact loads to the cargo in the CONUS and foreign railway tests. The impact calculations verify the test results which show that railcar impact loads to the cargo are more severe for foreign railcars than for CONUS railcars at similar impact velocities. (Author)

AD-635 241 Field 15E, 16D, 13F
CFSTI Prices: HC$3.00 MF$0.50
Army Transportation Engineering Agency, Fort Eustis, Va.
PERSHING TRANSPORTABILITY STUDY. CONUS RAILWAYS. VOLUME II.
Engineering rept.
by John H. Grier. Jul 66, 53p USATEA-66-11-Vol-2
See also AD-635 240.

Descriptors: (*Guided missiles (Surface-to-surface), Logistics), (*Railway cars, Guided missiles (Surface-to-surface)), (*Transportation, Guided missiles (Surface-to-surface)), Railroads, Containers, Mooring, Handling, Impact tests, Shock (Mechanics), Vibration, Chocks, Booster motors, Second-stage motors, Guided missile components.

Identifiers: Pershing, CONUS Railway, M-474 Containers, M-475 Containers, M-476 Containers.

CONUS railcars were used in conducting railcar impact tests on three research and development containers: the Pershing missile guidance and control section container (XM 474) and the first and second stage motor containers (XM 475 and XM 476). Data from the tests were used to determine scientifically the imposed shocks on the containers

and to evaluate the structural adequacy of the tie-down and restraint arrangements when subjected to CONUS railway environments contained in Department of the Army TB 55-100. The results of this study demonstrate that the arrangement recommended in USATEA Report 66-11, Volume III, AD-635 242, and shown in this report as Figures 1 and 2, satisfactorily withstood the test environments and provided greater structural integrity than the arrangement prescribed in the Savanna Army Depot drawing No. 5425, page 9. It is recommended that this system be adopted for CONUS and foreign railcar movements.

AD-635 242 **Field 15E, 16D, 13F**
CFSTI Prices: HC$2.00 MF$0.50
Army Transportation Engineering Agency, Fort Eustis, Va.
PERSHING TRANSPORTABILITY STUDY. FOREIGN RAILWAYS. VOLUME III.
Engineering rept.
by John H. Grier. Jul 66, 39p USATEA-66-11-Vol-3
See also AD-635 242.

Descriptors: (*Guided missiles (Surface-to-surface), Logistics), (*Railroad cars, Guided missiles (Surface-to-surface)), (*Transportation, Guided missiles (Surface-to-surface)), Booster motors, Railroads, Containers, Mooring, Second-stage motors, Impact tests, Shock (Mechanics), Vibration, Chocks, Handling.

Identifiers: Pershing, M-475 Containers, M-476 Containers.

Foreign railcars were used in conducting rail impact tests on Pershing missile system first and second stage motor containers, XM 475 and XM 476. Data from the tests will be used in evaluating the effects of the foreign rail environment on the containers and in determining if the procedures used in restraining the containers for CONUS rail shipment would be applicable to foreign rail shipment. The CONUS rail shipment restraining arrangement evaluated during this study was basically in conformance with pages 4 and 9 of Savanna Army Depot Drawing No. 5425. Results of the study showed that the container skid bolts do not have the required structural strength to resist the dynamic loading imposed by rail impacts. The 1/2-inch-diameter bolts attaching the skid to the container experienced shear failure at impact velocities of 7 miles per hour when the container skid was not abutted flush with the forklift receptacle. The results of the study also indicated that the restraining arrangement providing transfer of shocks into the forklift receptacle rather than to the container skids is the preferred arrangement. (Author)

AD-635 243 **Field 15E, 16D, 13J**
CFSTI Prices: HC$2.00 MF$0.50
Army Transportation Engineering Agency, Fort Eustis, Va.
PERSHING TRANSPORTABILITY STUDY. VESSEL STOWAGE. VOLUME IV.
Engineering rept.
by John H. Grier. Jul 66, 30p USATEA-66-11-Vol-4
See also AD-635 240.

Descriptors: (*Guided missiles (Surface-to-surface), Shipborne), (*Shipping (Marine), Guided missiles (Surface-to-surface)), (*Transportation, Guided missiles (Surface-to-surface)), Containers, Mooring, Cargo ships, Chocks, Loading (Mechanics), Storage, Handling, Second-stage motors, Logistics.

Identifiers: Pershing, M-476 Containers.

A vessel stowage static study was conducted on a Pershing missile system second stage motor container, XM 476. The purpose of the study was to evaluate the structural integrity of a proposed procedure for the stowage of an XM 476 and similar containers aboard a vessel subjected to adverse ocean environments, that is, State of Sea, Bowditch Scale 5-7. Dynamic loadings likely to accrue from such an environment were empirically reduced to static criteria and measurement. Other portions of the overall study will obtain actual measurements of the dynamic loading. The applied static loading conditions were (1) 3g vertical, (2) 3g transverse, and (3) 1g longitudinal. Results of the study showed that the container skids do not have the required structural strength to resist the applied static loading conditions. The proposed stowage plan and restraining procedure proved to be satisfactory in withstanding the applied static loads. (Author)

PB-169 476 **Field 15E, 12A, 5A**
CFSTI Prices: HC$16.30 MF$1.00
Stanford Univ., Calif. Graduate School of Business.
STATISTICAL ESTIMATION MODELS FOR OPTIMAL INVENTORY CONTROL,
by Robert Herrick Hayes. Feb 66, 169p
Technical rept. TR-15
Grant NSF-GS-552

Descriptors: (*Inventory control, Mathematical models), (*Statistical analysis, Inventory control), Management planning, Management control systems, Probability, Distribution functions, Statistical distributions.

The report develops and evaluates procedures for estimating simple inventory policies in the absence of complete knowledge about the probability distribution of demand. In the course of this investigation questions are also examined relating to policy review procedures. Discussion is first restricted to policy estimation in conjunction with a sequence of single period models. Dynamic considerations are then into the treatment by showing how in certain cases it is possible to approximate a dynamic model with a sequence of single period models.

AD-635 168 **See Field 14A**

AD-635 392 **See Field 12B**

PB-170 765 **See Field 13B**

PB-170 766 **See Field 13B**

15F. NUCLEAR WARFARE

AD-635 187 **Field 15F, 15C**
CFSTI Prices: HC$4.00 MF$1.00
URS Corp., Burlingame, Calif.
FORMATION OF DEBRIS FROM BUILDINGS AND THEIR CONTENTS BY BLAST AND FIRE EFFECTS OF NUCLEAR WEAPONS.
Final rept.
by J. Rotz, J. Edmunds, and K. Kaplan. Apr 66, 138p Rept. no. 5D-1101-3312B-1, URS-651-4
Contract OCD-PS-64-201
Original contains color. Reproduced in black/white only after stock is exhausted.

Descriptors: (*Nuclear explosions, *Debris), Nuclear weapons, Fires, Buildings, Airburst, Blast, Structures, Vulnerability, Recovery, Reclamation, Urban areas, Damage, Models (simulations), Civil defense systems, Graphics, Tables, Michigan.

Identifiers: Postattack.

The prime objective of this phase of work is to augment the debris prediction model with additional information (debris charts, failure overpressures, contents-debris criteria, estimating procedures and data, etc.) to facilitate its application and increase its range of applicability. To this end, new debris charts are presented which cover a more complete and detailed range of building types, along with a tabulation of failure overpressures for miscellaneous small structures (towers, poles, stacks, etc.). Criteria are developed for determination of debris from the contents of buildings, and furnished with these (for ease of use) are data relating the amount of material contained in buildings to building occupancy. A description of the debris prediction model and its operation and a detailed worked example are presented illustrating the use of the model to determine debris contours over an entire city (Detroit) and debris profiles along a route through the city. In this example, debris depths before and after fire and the percentage contribution by building contents and structural components in each case are given. (Author)

AD-635 250 **Field 15F, 13L**
CFSTI Prices: HC$3.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL HARDENING CONSIDERATIONS PERTAINING TO RESIDENTIAL AREAS.
by William J. Parker. 6 Jul 66, 56p USNRDL-TR-984

Descriptors: (*Nuclear explosions, Thermal radiation), (*Thermal radiation, *Fires), (*Buildings, Fire safety), Fire resistant materials, Hazards, Textiles, Pyrolysis, Ignition, Flammability.

The incendiary effects of thermal radiation from nuclear weapons on residential areas is considered. It is concluded that a hazard does exist and that the most desirable means of protection is to make the exposed materials ignition resistant. This has the benefit of providing fire protection in peace-time as well as in war and has a better chance of public acceptance. While some fireproof fabrics and flame retardant treatments for cotton and other materials are now available, there are drawbacks which hinder their universal acceptance. The development of new and improved methods of treatment depend upon an improved knowledge of the mechanisms of pyrolysis and ignition and a more fundamental understanding of the action of effective retardants. A discussion of some of the features of the pyrolysis, and ignition of cellulose and the action of flame retardants that are of importance in the thermal hardening problem is presented. Some experiments which may help to elucidate these processes are suggested. It is recommended that various fire retardant treatments including presently used chemical flame retardants, halogen flame inhibitors, preheating treatments, and exposure to ionizing radiation be evaluated in terms of the protection that they might provide against the thermal radiation from nuclear weapons. (Author)

AD-635 477 **Field 15F, 18C**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
NUCLEAR WEAPONS EFFECTS: COMPILATION OF ABSTRACTS.
Rept. no. 3 on ATD work assignment no. 95.
by Yuri Ksander. 19 Apr 66, 35p ATD-66-45 TT-66-61761
Based on Soviet open sources pub. 1964-1965 with a few earlier entries dating from 1956. Rept. on Surveys of Soviet Scientific and Technical Literature. See also AD-610 054.

Descriptors: (*Nuclear explosion damage, Reviews), Abstracts, Nuclear weapons, Shock waves, Gases, Electromagnetic fields, Impact shock, Stars, Meteorites, USSR.

The report is arranged in three sections. Section I discussed the structure and parameters of shock waves in gases. Section II discusses propagation of strong shock waves and their interaction with materials. The third section discusses shock waves in the stars and interstellar space.

AD-635 492 **Field 15F, 13L**
CFSTI Prices: HC$2.00 MF$0.50
IIT Research Inst., Chicago, Ill. Technology Center.
DESCRIPTION OF URBAN AREAS FOR FIRE ANALYSIS.

Final rept.
by F. Salzberg, A. J. Pintar, and F. J. Vodvarka.
Mar 65, 37p
Contract DCA-8

Descriptors: (*Urban areas, *Nuclear explosion damage), (*Fires, Urban areas), Buildings, Analysis, Fire safety, Physical properties, Structures, Materials, United States.

For various land use categories, typical blocks and structures were developed for describing an urban area in terms of parameters pertinent to the analysis of fire damage. Information employed consisted of the data from Sanborn maps, dupplied by Dikewood Corporation, and reports of the Cook County and Illinois Inspection and Rating Bureaus. Inquiries were also sent to all cities in the United States having population of 100,000 or more, regarding the data available for identification of physical characteristics of structures. (Author)

15G. OPERATIONS, STRATEGY, AND TACTICS

AD-457 894 **Field 15G, 15C**
CFSTI Price: HC$1.10
RAND Corp., Santa Monica, Calif.
ANALYSIS AND DEFENSE IN THE SIXTIES,
by James R. Schlesinger. Jan 65, 9p P-3050

Descriptors: (*Armed forces operations, Decision making), (*Economics, Armed forces operations), (*Logistics, Management engineering), Costs, Defense systems, Analysis, Nuclear warfare, Strategic warfare.

For abstract, see T 66 16.

AD-477 398 **Field 15G, 15C, 5C, 5D**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
DETERMINANTS OF NATO FORCE POSTURE.
by A. W. Marshall. Jan 66, 23p P-3280

Descriptors: (*Military organizations, *Europe), Armed forces (Foreign), Armed forces budgets, National defense, Economics, Logistics, Weapons, Costs, Decision making, Political science, Military training, Military personnel, Effectiveness.

Some reasons are presented to suggest why the Western European Allies obtain so little capability to defend themselves for the money they spend.

AD-634 786 **Field 15G, 12B**
CFSTI Prices: HC$1.00 MF$0.50
Joint Chiefs of Staff, Washington, D. C. Special Studies Group.
AN OPTIMUM MIX OF HETEROGENEOUS WEAPONS SYSTEMS.
by Jim J. Tozzi. 1966, 14p

Descriptors: (*Weapon systems, *Optimization), (*Game theory, Military tactics), Decision making, Model theory.

The objective of the present analysis is to demonstrate the applicability of differential gaming to problems concerning the optimum mix of weapons systems. The problem is formulated as a game between two sides, Blue and Red, over a given period of time. The Blue player, with two weapons systems A and B, desires an optimum mix of the two weapon systems. He then has a tactical allocation over time to the two weapons for an 'arsenal' mission and an enemy force 'attrition' mission. The Red player, with one weapon system C, has a similar tactical allocation to these two missions. The payoff is given in terms of both sides allocation to the 'arsenal' mission. (Author)

AD-635 475 **Field 15G, 5H, 5I**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
SYSTEM TRAINING FOR TACTICAL COMMAND AND CONTROL SYSTEMS.
Technical memo.
25 May 66, 33p TM-2804/000/01

Descriptors: (*Tactical air command, Training), (*Command + control systems, *Tactical warfare), (*Systems engineering, Command + control systems), Weapon systems, Man-machine systems, War games, Operations research, Military training.

Modern military operations are conducted with extremely complex combinations of individual hardware systems and organizational structures. Technological developments in weapons and defenses have created the need for highly specialized controlled agencies. The multitude of specialized control agencies has in turn necessitated the development of command and control systems capable of effectively applying the total resources for combat to the objectives of the commander. To be effective, these command and control systems must be effectively trained and exercised. One emerging class of command and control systems is that required for the conduct of tactical warfare. Several characteristics are common to the command and control systems of the tactical class and differentiate them from the more common, and perhaps more highly developed, defensive and strategic systems. Several factors complicate the problem of training these systems and, in fact, the very characteristics that define them as a class could be listed again under a heading such as Factors Posing Difficulties for Training Tactical Command and Control Systems. Add to those complications the conflicting interests and priorities of a peacetime environment, the economic conservatism regarding non-hardware military expenditures, the peacetime dispersion of military organizations, and effective system training seems almost an impossibility. (Author)

AD-635 056 **See Field 12B**

AD-635 236 **See Field 5D**

AD-635 283 **See Field 12B**

16B. MISSILE TRAJECTORIES

AD-635 014 **Field 16B, 19D, 17G**
CFSTI Prices: HC$3.00 MF$0.75
Boston Coll., Chestnut Hill, Mass. Research and Analysis Lab.
ASPECT OF A ROCKET FROM GYROSCOPIC DATA.
by Rene J. Marcou, and Paul N. Pruneau. 12 Apr 66, 87p Scientific-3
Contract AF 19 (628)-4178
Proj. AF-5710
AFCRL-66-349

Descriptors: (*Rocket trajectories, *Data processing systems), Aspect ratio, Angle of attack, Gyroscopes, Telemeter systems, Telemetering data, Programming (Computers), Digital computers, Numerical analysis.

Formulas are derived which determine the aspect of a rocket, the angle of attack of the rocket axis with respect to the velocity vector or any other given vector, the aspect of any vector perpendicular to the rocket axis, and the angle of attack of such a vector with respect to the velocity vector or any other given vector. The aspect of the rocket axis and vectors perpendicular to the rocket axis are expressed in terms of direction cosine angles, azimuth, and elevation. The attack angles are then obtained as functions of the direction cosines. The parameters describing the behavior of a rocket in flight are given as functions of the yaw and pitch of the rocket axis, the spin of the rocket, and the flight time. The inputs are the trajectory data and the yaw, pitch, and roll data in digital form. A general computer code is developed which is capable of automatically processing the input data to provide the flight parameters as functions of the flight time. To demonstrate the system developed, the flight parameters of a specific rocket flight are reduced from data generated by Whittaker 'Mars' roll stabilized two axis gyro on board the rocket. The trajectory data for the rocket is taken from radar beacon data. The 7044 computer program for this system and the resulting output data are exhibited. (Author)

AD-634 777 **See Field 4B**

AD-634 868 **See Field 20D**

AD-634 872 **See Field 20D**

AD-635 115 **See Field 4B**

16D. MISSILES

AD-466 549 **Field 16D, 17E, 17G**
CFSTI Prices: HC$2.60 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control Lab.
SIMULATION OF AN ATTITUDE DETERMINING SYSTEM UTILIZING MAGNETOMETERS AND EARTH'S HORIZON SENSOR.
Technical progress rept.
by William F. Baxter. 31 May 65, 30p
AMC-RG-TR-65-11

Descriptors: (*Attitude control systems, Magnetometers), (*Reentry vehicles, Attitude control systems), Simulation, Errors, Magnetic fields, Frequency modulation, Horizon scanners, Inertial guidance, Infrared radiation, Infrared detectors, Azimuth, Guidance, Systems engineering, Effectiveness.

This report presents experimental data obtained by partial simulation of a missile attitude determination system consisting of magnetometers sensing the earth's magnetic field and a sensor responding to the earth's horizon. The contribution of various errors to system error is outlined. A basis is provided for possible future work concerning the affect of on-board interference. (Author)

AD-635 240 **See Field 15E**

AD-635 241 **See Field 15E**

AD-635 242 **See Field 15E**

AD-635 243 **See Field 15E**

17A. ACOUSTIC DETECTION

AD-462 064 **Field 17A**
CFSTI Price: HC$1.60
Naval Air Development Center, Johnsville, Pa. Anti-Submarine Warfare Lab.
PROBABILITY DISTRIBUTION SYSTEM FOR ANALYZING SONAR SIGNALS AND PROCESSING EQUIPMENTS.
by Donald Savage, and Anthony de Piano. 29 Mar 65, 16p NADC-AW-6434
Task RUDC3B000/2021/F001-03-01

Descriptors: (*Sonar signals, Data processing systems), (*Data processing systems, Sonar signals), Distribution, Density, Probability, Errors, Functional analysis, Information theory.

The purpose of this report is to describe a capability of conducting the probability distribution analysis of complex time variant functions using equipment available at NAVAIRDEVCEN together with interface circuitry developed in the laboratory. The probability distribution analysis system developed here is of special interest as a tool for making signal structure comparisons and for evaluating sonar signal processing equipments. Such analyses are of interest when dealing with data of a statistical nature, such as the random processes of sonar signals effected by the media. The importance of determining the probability density functions and error probabilities becomes evident when detection threshold levels must be set or sig-

nal processing techniques must be selected. The equipment is described briefly and diagrams of the interface circuits are given. Some applications for the equipment are given and the results of an analysis of two test signals are discussed. From the successes attained to date in analyzing the test signals it is concluded that the probability distribution analysis system has the capability of describing the probability density functions required for computation of sonar system detection capability. (Author)

AD-635 214 **Field 17A**
CFSTI Prices: HC$1.50 MF$0.50
Navy Underwater Sound Lab., New London, Conn.
EQUATIONS OF MOTION FOR A TOWED BODY MOVING IN A VERTICAL PLANE.
Research rept.
by Kirk T. Patton, and Jeffrey W. Schram. 15 Jun 66, 42p USL-736
Proj. SF-101-03-20
Task 8056

Descriptors: (*Equations of motion, *Towed sonar), Towed bodies, Hydrodynamics.

Equations of motion are developed for a towed body moving in a plane defined by gravity and the fore-and-aft axis of the ship. Solution of the cross-coupled equations enables predictions to be made of towed body heave, surge, and pitch motions. The towline is approximated as a spring with one third of its mass added to the body at the towpoint. A discussion of computational techniques to compute masses, damping constants, and spring constants is also presented. Because of the number of terms in the equations for heave, surge, and pitch, the solutions have been programmed in FORTRAN IV. (Author)

AD-635 394 **Field 17A**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
A COMPARISON OF THREE MODELS FOR SEQUENTIAL OBSERVATIONS IN SONAR DETECTION.
Research paper.
by Donald L. Iglehart. Mar 66, 27p RP-P-252
Contract SD-50
Task T-37

Descriptors: (*Sonar, Mathematical models), Sequential analysis, Detection, Probability, Signal-to-noise ratio, Statistical functions.

The paper compares three mathematical models which have been proposed to describe the sonar detection problem in the case of sequential observations. The first model assumes complete independence between observations. The second model assumes a constant dependence between observations, independent of the time between observations. Finally, the third model assumes a dependence between observations which decays exponentially as the time between observations increases. These models have been presented in a consistent and unified manner to facilitate comparison. As would be expected, the independent model requires uniformly smaller signal-to-noise ratios for any probability of detection than the other two models and the third model requires uniformly smaller signal-to-noise ratios than does the second model. However, in the range of detection probabilities 0.3-0.7, the maximum increase in signal-to-noise ratio required for the constant correlation model over the exponentially decaying model is less than 14 percent. (Author)

AD-635 479 **See Field 8A**

AD-635 530 **See Field 14B**

17B. COMMUNICATIONS

AD-293 400 **Field 17B, 14D, 22B**
CFSTI Price: HC$12.60
General Electric Co., Owensboro, Ky. Receiving Tube Dept.
A RELIABLE, LONG-LIFE, PLANAR TRIODE FOR A COMMUNICATIONS SATELLITE.
Rept. no. 8, 1 Oct 60-17 Aug 62 (Final).
17 Aug 62, 130p
Contract DA-36-039-sc-85047, ARPA Order-54-60-ADVENT

Descriptors: (*Communication satellites (Active), Reliability (Electronics)), (*Radio communication systems, Triodes), Satellites (Artificial), Life expectancy, Cathodes (Electron tubes), Electron tube heaters, Electrodes, Probability.

For abstract, see T 66 16.

AD-634 801 **Field 17B, 9A, 14B**
CFSTI Prices: HC$11.60 MF$0.75
Westinghouse Research Labs., Pittsburgh, Pa.
CONDUCTED ELECTROMAGNETIC INTERFERENCE MEASUREMENT SURVEY, 500-130,000 VOLTS.
Final research rept.,
by W. E. Pakala, E. R. Taylor, and R. C. Patterson. 31 Dec 61, 114p RR-475-B001-R1
Contract NBy-17825

Descriptors: (*Radiofrequency interference, Measurement), (*Transmission lines, Radiofrequency interference), (*Interference analyzers, Transmission lines), Voltage, Test methods, Probes (Electromagnetic).

An investigation was made to determine safe and efficient electromagnetic interference measurement techniques which will permit detection and measurement of conducted electromagnetic interference emanating from high voltage power lines. It is recommended: That on high voltage circuits and lines the current be measured instead of the voltage. That the current from machinery and substation circuits rated below 15,000 volts line to line be measured with a current transformer or probe designed for 10,000 volts to ground. That the current in distribution lines up to 15,000 volts line to line be measured with a high voltage current probe similar to one described in report or by means of an insulated bucket type lift truck and a low voltage current probe. That the current be measured on lines up to 130,000 volts by means of the insulated bucket type lift truck. (For voltages up to 130,000 volts the shielded cage used for tests made 345,000 volts and described in this report, is not needed.) For all the above measurements the presently available a-c operated FI-R1 meters can be used since battery operated inverters can be carried in the lift-truck bucket along with the instruments. (Author)

AD-635 271 **Field 17B, 11F, 11A, 11G K**
CFSTI Prices: HC$4.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
MATERIALS USED IN RADIO ELECTRONICS.
by A. G. Sobolevskii. 11 Feb 66, 58p FTD-MT-65-69
TT-66-61683
Edited machine trans. of mono. Materialy v Radioelektronike, Moscow/Leningrad, 1963 p1-48.

Descriptors: (*Materials, *Radio equipment), Alloys, Metals, Electrical conductance, Dielectrics, Magnetic materials, Wood, Adhesives, Paints, Varnishes, USSR.

Reference book contains information about materials with which the radio amateur deals during the designing of radio equipment: conductors, dielectric, structural metals and insulating material, low-frequency and high-frequency magnetic materials, and also different auxiliary materials - adhesives, wood, lacquers, and enamels. The book is intented for amateur radio designers. (Author)

AD-635 462 **Field 17B, 9D**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
OPTIMUM MESSAGE LENGTH FOR A DATA COMMUNICATIONS SYSTEM USING RETRANSMISSION ERROR CONTROL.
by Larry L. Stine. Jun 66, 41p MTR-189
Contract AF 19 (628)-5165
Proj. AF-705B
ESD-TR-66-110

Descriptors: (*Information theory, Optimization), (*Mathematical models, *Data transmission systems), Digital systems, Communication systems, Errors, Control.

In this report, a mathematical model of a data communications system using retransmission error control is developed. System performance is specified by information throughput, the amound of error-free data transferred per unit of time. Information throughput is determined as a function of message length, taking into account transmission delay, channel error rate, and overhead words in the data message. (Author)

AD-635 500 **Field 17B**
CFSTI Prices: HC$1.00 MF$0.50
Electro-Voice, Inc., Buchanan, Mich.
LIGHTWEIGHT AUDIO ACCESSORIES.
Quarterly rept. no. 3, 1 Jan-31 Mar 66.
by B. T. Cochran. May 66, 17p
Contract DA-28-043-AMC-01542 (E)
Proj. 5642.12.922.07.02
ECOM-01542-3
See also AD-631 492.

Descriptors: (*Communication equipment, Portable), Microphones, Earphones, Telegraph equipment, Performance (Engineering), Weigh, Reduction.

The report contains a summary of the work performed for the design and construction of a lightweight and miniature type handset, hand held microphone, double earphone headset and telegraph key. This report also contains a review of the work performed in this period which consisted of electrical and electroacoustical tests and finalizing of design in order to obtain tooling and materials for the twenty each Engineering Development models of these accessories. (Author)

PB-169 568 **Field 17B**
CFSTI Price: HC$9.60
General Dynamics/Electronics, Rochester, N. Y.
FEASIBILITY STUDY OF TRANSISTORIZED CODER-MULTIPLEXER.
Technical note,
by Arthur S. Howell. Dec 60, 94p Rept. no. 1820-TN-1
Contract AF 30 (602)-2262
Proj. AF-5570
Task 55215
RADC-TN-61-37

Descriptors: (*Voice communication systems, Multiplex), (*Telephone communication systems, Multiplex), (*Speech compression, Multiplex), Feasibility studies, Coding, Multiple operation, Semiconductor devices, Speech recognition, Frequency, Sound pitch, Circuits, Bandwidth, Modulation, Speech, Synthesis.

Identifiers: Vocoders.

The report discusses the initial engineering phases undertaken to determine the feasibility of providing a system of multiple vocoders fed from telephone inputs and operating over a single voice frequency channel. An important consideration is the improvement of voice quality over that of conventional speech compression devices. To this end: voice excited and channel vocoders were investigated to determine a means for optimum pitch extraction in the absence of the fundamental pitch frequencies of talkers, compatible with minimum baseband requirements; means for the measure-

ment of speaker recognition were developed; and comparisons of speaker recognition were made between a hybrid vocoding arrangement and several channel vocoders employing 17, 22 and 27 channels. It is shown that pitch may be derived in the absence of the speaker's fundamental voice frequencies. It is also shown that a significant improvement in speech quality can be accomplished when a direct baseband is added to a channel vocoder and voice excitation techniques are applied. Multiplexing means necessary to establish the maximum number of complete speech channels within a telephone frequency range are discussed. Consideration is given to two methods offering maximum economy of bandwidth requirements. One combines time division sampling of spectrum information with frequency division multiplexing of each speech channel. The second applies quadrature modulation to frequency division multiplexing. (Author)

PB-170 346 **Field 17B, 17G, 1C, 5C**
CFSTI Prices: HC$3.00 MF$0.50
Adams (T. F. M.) and Co., Ltd., Tokyo (Japan).
THE MARKET FOR AIRCRAFT COMMUNICATIONS EQUIPMENT IN JAPAN. PART II.
15 Sep 65, 59p
Prepared in cooperation with Busniess and Defense Services Administration, Dept. of Commerce, Washinton, D. C. Prepared for presentation at Equipment for Aviation Industry Exhibition, Tokyo, September 19-27, 1966. See also PB-170 345.

Descriptors: (*Aircraft, Communication equipment), (*Communication equipment, Economics), (*Japan, Economics), (*Navigational aids, Commerce), Radio communication systems, Ground-controlled approach radar, Meteorological radar, Direction finding, Airport radar systems, United States.

Summary and conclusions: There seems to be little doubt that there is a good and increasing market for U.S. aircraft connected communications equipment and for instruments and tools for the maintenance of such equipment. U.S. equipment is considered of high performance, reliable and durable. Even though U. S. prices for commonly used equipment are in some cases high, it is not so for all products, as Japan still cannot produce such quality products at competitive prices. Some samples of opinions obtained both on U.S. equipment and the products which should be shown at an exhibition, as having the best future sale potential, are given. (Author)

AD-466 441 **See Field 9D**

AD-634 819 **See Field 5A**

AD-634 829 **See Field 9E**

AD-635 101 **See Field 14B**

AD-635 488 **See Field 9D**

AD-635 498 **See Field 9A**

PB-170 360 **See Field 9F**

17C. DIRECTION FINDING

AD-635 268 **See Field 9E**

17D. ELECTROMAGNETIC AND ACOUSTIC COUNTERMEASURES

AD-634 991 **Field 17D, 14D**
CFSTI Prices: HC$2.00 MF$0.50
Defense Systems Lab., Syracuse Univ. Research Corp., N. Y.
INSTALLATION AND ENVIROMENTAL TEST OF LIGHT SIGNAL MONITOR FACILITY AN/TSQ- ( ).
Test rept.
by Gordon H. LaTourette. 1 Jun 66, 46p DSL-R-146
Contract N00014-66-C0118

Descriptors: (*Monitors, Signal lights), (*Shelters, Environmental testing), (*Electronic equipment, Environmental testing), Communication equipment, Portable, Electronic countermeasures, Impact tests, Vibration, Drop testing.

A prototype Light Signal Monitor Facility AN/TSQ- ( ) was subjected to specified shock, vibration, and environmental testing at Albany, Georgia. The system met or exceeded the requirements of all tests to which it was subjected. Although minor damage was sustained by the shelter as a result of the drop test, the electronic equipment continued to operate properly. A transistor failure experienced in the AN/PRC-47 Radio Set when it was switched to high power was determined to be unrelated to the system testing. Comments on the testing and recommendations for procurement systems are included. (Author)

17E. INFRARED AND ULTRAVIOLET DETECTION

AD-634 789 **Field 17E, 20C**
CFSTI Prices: HC$3.00 MF$0.75
CBS Labs., Stamford, Conn.
SPECIAL XUV DETECTORS FOR PHOTOELECTRON EMISSION STUDIES.
Final rept., 1 Feb 63-31 Mar 66,
by C. E. F. Misso, and S. Trotta. 30 Apr 66, 70p
Contract AF 19 (628)-2483, ARPA Order-213
Proj. AF-3809
Task 380902
AFCRL-66-353

Descriptors: (*Ultraviolet detectors, *Photoelectric effect), Ultraviolet radiation, Electron multipliers, Aluminum, Films, Photocathodes, Voltage dividers, Probes (Electromagnetic), Atmospheric sounding.

Windowless detectors combining retarding potential analyzers and CBS type 14-stage linear focussed electron multipliers were designed and built for laboratory XUV studies. These detectors were designed to study photoemission generated by incident and transmitted photons. Included were single and remotely controlled eight cathode units. A substantial counting plateau and a single electron peak or knee was observed during operation of these devices. Thin aluminum film development demonstrated the difficulty in making thin films with similar photoelectric properties in both sides. The feasibility of using a thin aluminum film coated with a layer of low density KCl as a combination XUV filter and high electron multiplier stage was demonstrated. Rugged detectors using planar retarding potential analyzers and electron multipliers were designed to study the electron energy (50eV) distribution within and above the earth's atmosphere. (Author)

AD-466 549 **See Field 16D**

17F. MAGNETIC DETECTION

AD-635 285 **Field 17F, 18C, 8E**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
GROUND-LEVEL MAGNETIC FLUCTUATIONS DUE TO HIGH-ALTITUDE NUCLEAR BURSTS OR IMPULSE SOURCES OF NATURAL ORIGIN.
by E. C. Field, and C. Greifinger. May 66, 44p
RM-4946-ARPA
Contract SD-79, ARPA Order-189-1

Descriptors: (*Nuclear explosions, Detection), (*Terrestrial magnetism, Explosion effects), Analysis of variance, Sources, High altitude, Time, Wave transmission, Electromagnetic waves, Ionosphere, Exosphere.

The Memorandum is part of a continuing study of the detection of high-altitude nuclear explosions. It is concerned with low-frequency hydromagnetic waves generated by such explosions and counted at worldwide locations. It should be of interest to those concerned with ground-level magnetic signals generated by either high-altitude nuclear bursts or sources of natural origin. (Author)

17G. NAVIGATION AND GUIDANCE

AD-297 200 **Field 17G**
CFSTI Price: HC$1.60
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control Lab.
SIMULATION OF SINGLE AXIS INERTIAL REFERENCE SERVO LOOP WITH DIGITAL GYRO PICKOFF.
by Keith Crozier. 10 Jan 63, 12p
AMC-RG-TR-63-7

Descriptors: (*Inertial guidance, Servomechanisms), Analog systems, Digital systems, Gyroscopes, Feasibility studies, Simulation.

The feasibility of the use of a digital gyro pickoff in an inertial reference servo loop is studied here. First, a standard inertial reference servo loop is simulated. The signal representing the gyro angle is then applied to an analog simulation of a digital encoder. The signal representing the encoder is then applied to the servo loop simulation as the pickoff output. The advantages of using a digital encoder as a gyro pickoff are: (1) reaction torques are absolutely zero; (2) null position is accurately repeated over long times and varied temperatures; (3) encoder material has a stable center of gravity; and (4) the gradient is exceptionally linear and repeatable. (Author)

AD-445 290 **Field 17G**
CFSTI Price: HC$8.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
INVESTIGATION OF PRECISION POSITION DETERMINATION BY DISTANCE-MEASURING TECHNIQUES.
by Russell A. Rollin Jr, Hodge W. Doss Jr, Elmer H.Smith, and Randall E. Cline. Aug 64, 85p Rept. no. 2900-453-T
Contract DA-36-039-sc-78801
Proj. 3D5801001
Report on Proj. Michigan.

Descriptors: (*Position finding, Distance-measuring equipment), (*Distance-measuring equipment, Position finding), Reviews, Atomic clocks, Masers, Target position indicators, Ranges (Distance), Programming (Computers), Mathematical models, Signals, Refraction.

An exploratory investigation study and analysis of precision position determination by distance-measuring techniques was conducted. The report reviews physical principles, electronic methods, and modern oscillators as they apply to real-time coordination in relative frameworks. A quadrangulation system is proposed and formulated as a mathematical model on an LPG-30 computer. The model includes a preliminary error analysis. A balanced experimental and analytical program is outlined toward realization of very precise position determination in order to impose implicit calibration upon signals that have undergone atmospheric refraction. (Author)

AD-635 195 **Field 17G, 20D, 9B**
CFSTI Prices: HC$3.00 MF$0.75
IIT Research Inst., Chicago, Ill.
FLUERICS: 20. STUDIES ON TWO-DIMENSIONAL TURBULENT JETS.
Summary rept.
by Dennis W. Prosser, and Michael J. Fisher. Apr 66, 112p

Contract DA-49-186-AMC-192 (D)
Projs. DA-1P010501A001, HDL-31100
Proj. IITRI-N6106. See also AD-633 689.

Descriptors: (*Fluid amplifiers, *Signal-to-noise ratio), (*Jets, Fluid amplifiers), Turbulence, Computers, Two-dimensional flow, Stagnation point, Pressure, Hydraulic systems, Momentum.

Identifiers: Fluerics.

The report summarizes the results of an investigation on the 'noise' problem associated with the operation of single-stage proportional amplifiers. Specifically concerned are the numerical values of signal and noise in terms of momentum flux for flow through a slightly blocked receiver. The theoretical approach developed for determining these values was verified experimentally. The major results show that (a) with the receiver held stationary in the power jet, the noise-to-signal ratio at the receiver entrance is minimized by keeping the receiver near the centerline of the power jet; and (b) with the receiver moving relative to the power jet, the ratio of noise to change in signal is minimized by keeping the receiver away from the power-jet axis. (Author)

AD-635 384 **Field 17G, 5I, 5E**
CFSTI Prices: HC$4.00 MF$0.50
Human Factors Research, Inc., Santa Barbara, Calif.
GEOGRAPHIC ORIENTATION IN AIRCRAFT PILOTS: CONTEMPORARY CHARTS AND PILOT PERFORMANCE.
Technical rept.
by William E. Osterhoff, and James J. McGrath.
May 66, 49p TR-751-6
Contract Nonr-4218 (00)
Proj. NR-213-028

Descriptors: (*Pilots, Performance (Human)), (*Navigation charts, Effectiveness), Flight simulators, Terrain, Visual signals, Navigation, Geography, Human engineering, Low altitude.

Three different aeronautical charts were evaluated in terms of their relative effectiveness as visual navigation aids. Geographic orientation performances of three groups of pilots were measured under conditions of simulated, VFR, flight. One group used the Sectional Aeronautical Chart, another used the Operational Navigation Chart (ONC), and a third used the Pilotage Chart (PC). After a practice sortie, each pilot flew two test sorties over different routes of simulated flight. The poorest performances were achieved with the PC on one route and with the ONC on the other route. Pilots using the Sectional performed as well as or better than those using either the PC or the ONC on both routes. It was concluded that the relative effectiveness of aeronautical charts is specific to the terrain over which the pilots must navigate. The PC was an effective navigation aid when used over terrain having a substantial number of visual landmarks, but was less plus or minus tive than the plus or minus charts when used over terrain having few available landmarks. (Author)

PB-169 663 **Field 17G**
CFSTI Prices: HC$3.60 MF$0.50
Federal Aviation Agency, Kansas City, Mo. Systems Maintenance Div.
EVALUATION OF AN ILS GLIDE SLOPE MONITOR TECHNIQUE USING A MONITOR DETECTOR WITH TWO ANTENNAS.
Interim rept.
by William Mumper. Dec 65, 40p
Projs. SRDS-320-101-01N, GR-6750-2-012
RD-65-102

Descriptors: (*Glide path systems, Monitors), Instrument landings, Aviation safety, Test equipment (Electronics).

This report concerns the installation and evaluation of a newly developed clearance monitor system for the standard ILS null reference glide slope. The new system was proposed by Mr. Henry H. Butts of the Federal Aviation Agency's Systems Research and Development Service. It is designed to provide an indication of the glide slope path width that is independent of snow cover conditions or changes in path angle. With minor exceptions, the test monitor system performed in the manner predicted by Mr. Butts. These exceptions relate principally to the detector point location in the near field, but do not derogate the system's application. This report finds that the proposed monitor system is superior to the present monitor system. It finds the principal disadvantages are the additional height required for the monitor antenna support and the cost of the additional components required. (Author)

PB-169 665 **Field 17G, 17I**
CFSTI Prices: HC$13.60 MF$1.00
Whittaker Corp., North Hollywood, Calif. Electronics Div.
ATCBI INDICATOR SITE IMPROVEMENTS: MODELS ATCBI-2 AND ATCBI-3.
Final rept.
Dec 65, 138p
Contract FA-WA-4706
Proj. 242-005-02
RD-65-132

Descriptors: (*Radar beacons, Air traffic control systems), (*Air traffic control systems, Radar beacons), Transponders, Modification kits, Aeronautics.

Identifiers: ATCBI-2, ATCBI-3.

A modification program was initiated for the ATCBI indicator Site equipment in accordance with Federal Aviation Agency Specification FAA-E-2002a. This specification required certain operating characteristics be altered and other operational capabilities be added to both the ATCBI-2 Indicator Site Equipment Group and the ATCBI-3 Indicator Site Equipment Group. This equipment was successfully modified to meet the full requirements of specification FAA-E-2002a, and the end result of this program was modification kits suitable for field installation in the basic equipment. A separate modification kit was produced for installation in the ATCBI-2 Indicator Site Equipment Group and in the ATCBI-3 Indicator Site Equipment Group. The contractor is submitting no additional recommendations as a result of this modification program as both the intent and the detailed requirements of specification FAA-E-2002a have been fulfilled in the design of these modification kits. (Author)

AD-437 802 **See Field 12A**

AD-466 549 **See Field 16D**

AD-635 014 **See Field 16B**

PB-170 346 **See Field 17B**

17H. OPTICAL DETECTION

AD-635 393 **Field 17H**
CFSTI Prices: HC$2.00 MF$0.50
Applied Psychological Services, Wayne, Pa.
CONSPICUITY OF FLUORESCENT AND NON-FLUORESCENT STIMULI.
Final rept. 21 Apr 64-Mar 66.
by Arthur I. Siegel, R. S. Lanterman, John Lazo, Edmund C. Gifford, and Joseph R. Provost. 1 Jun 66, 37p
Contract N156-44911
NAEC-ACEL-537

Descriptors: (*Fluorescence, Detection), (*Detection, Visual signals), (*Paints, Detection), (*Aircraft, Detection), Colors, Flight, Simulation, Optical properties.

Two investigations were performed into the conspicuity of stimuli equated for luminance, but of different purity and of different dominant wave length. In these experiments, subjects performed a simulated flight and responded to the stimuli as the stimuli appeared at various azimuth locations against a simulated sky background. The results supported the contention that purity will affect detection time in the simulated flight situation and that wave length also exerts an important effect. (Author)

PB-169 548 **Field 17H, 17J, 1E**
CFSTI Prices: HC$3.00 MF$0.75
Whittaker Corp., North Hollywood, Calif. Electronics Div.
ATCBI TRANSMITTER SITE IMPROVEMENTS. MODEL ATCBI-3.
Final rept.,
by F. V. Hale Jr. Dec 65, 57p
Contract FA-WA-4707
Proj. 242-001-01
SRDS-RD-65-118

Descriptors: (*Air traffic control systems, Radar transmitters), (*Airport radar, Modification kits), (*Radar transmitters, Modification kits), (*Modification kits, Air traffic control systems), All-weather aviation, Civil aviation, Airport control towers, Antenna radiation patterns, Omnidirectional antennas, Switching circuits, Radio transmitters, Trigger circuits, Pulse generators, Beacons, Transponders.

Identifiers: ATCBI-3.

A modification program was initiated for the ATCBI Transmitter Site equipment in accordance with Federal Aviation Agency Specification FAA-R-1404a. This specification required certain operating characteristics be altered and other operational capabilities be added to the ATCBI-3 Transmitter Site Equipment Group. Maximum transmitter output power was increased, side-lobe suppression pulse generation and monitoring circuits were added, three-mode interlace operation was added, output rf switching between a directional and omnidirectional antenna was added, ancillary trigger outputs were added, and certain local control functions were deleted. This equipment was successfully modified to meet the full requirements of specification FAA-R-1404a, and the end result of this program was a modification kit suitable for field installation in the basic equipment. (Author)

AD-635 015 **See Field 20F**

17I. RADAR DETECTION

AD-634 795 **Field 17I, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center Washington, D. C.
BWR - X12 GROUND WEATHER RECONNAISSANCE RADAR.
Jun 66, 14p FSTC-HT-23-105-66
Proj. 2301-6553
TT-66-61577
Trans. of Nazemnaya Radiolokatsionnaya Stantsiya Dlya Razvedki Pogody, n.p. papers, n.d.

Descriptors: (*Meteorological radar, East Germany), (*Weather forecasting, Meteorological radar), Weather stations, Radar equipment, Performance (Engineering), Specifications.

Identifiers: BWR-X12 Weather Radar.

This is the manufacturers brochure (in Russian) for the East German-made BWR-X12 ground-based weather reconnaisance radar set. Applications, performance, weights, echo-suppression features are described. (Author)

AD-634 886 **Field 17I, 20E, 4B**
CFSTI Prices: HC$5.00 MF$1.00
Space and Information Systems Div., North American Aviation, Inc.
DESIGN STUDY OF LASER RADAR FOR DETECTION OF CLEAR AIR TURBULENCE.
Final rept. 1 Apr 65-15 Apr 66,
by R. C. Breece, D. L. Fried, and R. J. Munick.
Jun 66, 170p SID-66-450
Contract AF 19 (628)-5135
Proj. AF-6020, AF-6670
Tasks 602003, 667007
AFCRL-66-354

Descriptors: (*Clear air turbulence, Radar scanning), (*Doppler radar, *Lasers), (*Meteorological radar, Lasers), Aerosols, Light, Backscattering, Demodulators, Phototubes, Aircraft equipment.

The objective of the research was to perform a design study and feasibility demonstration of a Doppler laser radar system for use in detection of clear air turbulence. Both CW and pulsed radar techniques were investigated to determine applicability to analysis of laser light backscattered from atmospheric molecules and aerosol particles in order to measure macroscopic motion of the air. It was desired to detect wind gusts in excess of 25 feet per second while operating in a jet aircraft at an altitude of approximately 30,000 feet. The program included analysis of design requirements, analysis of light scattering by the atmosphere, a design trade-off study, and an experimental demonstration. It was concluded that, if particulate matter exists at flight altitudes in sufficient concentration and if advances in the laser state of the art permit fabrication of a laser with the required performance, a system with a range of up to 50 nautical miles is feasible. The analysis showed that the system must depend on scattering from aerosol particles and that a pulsed system has significant advantages over a CW system. A system concept is described which employs detection of beat frequencies in the output current of a photodetector resulting from photo-mixing of the backscattered light from two laser pulses illuminating separated volumes of air. An experimental demonstration was attempted which optically combined the light scattered from two streams of smoke moving at different velocities. The scattering volumes were illuminated by focusing the expanded output beam of an argon laser. The results of the experiment showed that the desired effects can not be observed at short ranges because the extremely small scattering volumes required do not allow simultaneous detection of light from a statistically significant number of particles in the two volumes. (Author)

AD-635 030 **Field 17I, 4B, 1B**
CFSTI Prices: HC$5.00 MF$1.00
Michigan Univ., Ann Arbor.
AIRBORNE INVESTIGATIONS OF CLEAR AIR TURBULENCE WITH OPTICAL RADAR.
progress rept.,
by P. A. Franken, J. A. Jenney, and D. M. Rank. Dec 65, 175p
Contract Nonr-1224 (51)

Descriptors: (*Clear air turbulence, Radar scanning), (*Opdar, *Meteorological radar), (*All-weather aviation, Clear air turbulence), Airborne, Flight instruments, Lasers, Radar equipment, Radar echo areas, Aerosols, Atmospheric motion, Flight testing, Aviation safety.

The program was initiated to explore the possibility that characteristic optical radar echoes might actually be correlated with clear air turbulence. A light twin engine airplane was equipped with a laser radar and ancillary equipment for monitoring acceleration, temperature variations, and relevant meteorlogical data. The design of this equipment and the development of the flight programs was predicated on theoretical considerations of optical scattering from particulate matter. (Author)

AD-635 485 **Field 17I, 1D**
CFSTI Prices: HC$3.00 MF$0.50
Huyck Systems Co., Huntington Station, N. Y.
IN-FLIGHT TERRAIN AND RADAR SIMULATOR.
Final rept. no. 4, 29 Jun-9 Nov 65.
by Melvin Feller. Apr 66, 31p
Contract DA-28-043-AMC-01615 (E)
Projs. DA-1D1-20601-A219, FR-28-043-A5-20561 (E)
Task 03
ECOM-01615-2

Descriptors: (*Radar equipment, *Flight simulators), Airborne, Electronic equipment, Simulation, Doppler radar, Terrain, Display systems, Flight instruments, Data processing systems.

The In-Flight Terrain and Radar Simulator (TARS), is an airborne electronic system capable of accepting inputs of Doppler velocity, Altitude above an arbitrary reference level and Antenna Reference angle. The outputs consist of a simulated forward scanning radar, (Main Bang and Radar Return), Terrain Profile, Radar Altikude and Antenna Scan Angle. The report describes the design concept and input-output functions of TARS. Accuracies, signal generation as well as a general system discussion are included in the text. Methods for extending terrain storage and terrain computation range are included. (Author)

AD-427 062 **See Field 20I**

AD-444 792 **See Field 20I**

AD-634 819 **See Field 5A**

AD-634 983 **See Field 4B**

AD-635 137 **See Field 22C**

PB-169 665 **See Field 17G**

PB-170 636 **See Field 4B**

17J. SEISMIC DETECTION

PB-169 548 **See Field 17H**

18A. FUSION DEVICES (THERMONUCLEAR)

AEC-TR-6670 **Field 18A, 20I**
CFSTI Prices: HC$3.00 MF$0.75
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
NUCLEAR FUSION.
Translated Selected Articles.
1966, 68p
Translated from Nucl. Fusion, v5 p125-43, 150-5 (1965).

Descriptors: (*Thermonuclear reactions, Plasma medium), (*Plasma medium, Cyclotrons).

For abstract, see N 20 14.

LA-3416 **Field 18A**
CFSTI Prices: HC$4.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
COMPUTATION OF ELECTROSTATIC AND RAPIDLY PULSED MAGNETIC FIELDS.
by K. R. Crandall, and H. R. Lewis. Oct 65, 103p
Contract W-7405-eng-36

Descriptors: (*Magnetic fields, Electrostatics), (*Electrostatic fields, Thermonuclear reactions).

For abstract, see N 20 14.

ORNL-3938 **See Field 20I**

18B. ISOTOPES

AGN-8135 **Field 18B, 21F, 8H**
CFSTI Prices: HC$5.00 MF$1.00
Aerojet-General Nucleonics, San Ramon, Calif.
EVALUATION OF RADIOISOTOPE APPLICATIONS IN HYDROSPACE.
Final rept.
by K. E. Buck, J. P. Lehman, and R. H. Black.
Mar 65, 162p
Contract AT (04-3)-368

Descriptors: (*Radioactive isotopes, Nuclear industrial applications), (*Underwater-to-surface, Radioactive isotopes).

For abstract, see N 20 14.

CONF-651206 **Field 18B**
CFSTI Prices: HC$3.00 MF$0.75
Division of Isotopes Development (AEC), Washington, D. C.
ISOTOPE SYSTEMS DEVELOPMENT PROGRAM.
Annual Contractors Meeting (7th) December 6-8, 1965.
Mar 66, 13p

Descriptors: (*Neutron activation, Tracer studies), (*Nuclear industrial applications, Radioactive isotopes).

K-1653 **Field 18B, 7A**
CFSTI Prices: HC$4.00 MF$0.75
Oak Ridge Gaseous Diffusion Plant, Tenn.
ENGINEERING-SCALE STUDIES OF BORON ISOTOPE SEPARATION.
by J. R. Merriman, J. H. Pashley, and N. W. Snow. 15 Apr 66, 117p
Contract W-7405-eng-26

Descriptors: (*Isotope separation, Boron), (*Boron, Chemical engineering).

For abstract, see N 20 14.

MLM-1293 **Field 18B, 7A**
CFSTI Prices: HC$1.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
ENRICHMENT OF 21 NE TO 62 PERCENT IN A 48-FOOT THERMAL DIFFUSION COLUMN SYSTEM.
by J. Kenneth Kaminski, and Charles F. Eck. 2 Aug 65, 13p CONF-650902-13
Contract AT (33-1)-GEN-53
Prepared for presentation at the National meeting of the American Chemical Society (150th), Atlantic City.

Descriptors: (*Neon, Isotope separation), (*Thermal column, Neon).

For abstract, see N 20 14.

ORNL-3839 **Field 18B**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge National Lab., Tenn.
PREPARATION OF /SUP 131M/XE, /SUP 129M/XE, AND 79 KR.
by E. H. Acree. May 66, 15p
Contract W-7405-eng-26

Descriptors: (*Xenon, Radioactive isotopes), (*Radioactive isotopes, Krypton).

For abstract, see N 20 14.

ORNL-3903 **See Field 7E**

18C. NUCLEAR EXPLOSIONS

AD-635 037 **Field 18C, 6R**
CFSTI Prices: HC$2.00 MF$0.50
Reynolds Electrical and Engineering Co., Inc., Mercury, Nev.
PROJECT DRIBBLE-SALMON EVENT ON-SITE HEALTH AND SAFETY REPORT,

by J. Tell Tappan, and William E. Moore. Nov 65, 54p
Contract AT (29-2)-162
AEC-VUF-1025
Report on Vela Univorm Program, Tatum Salt Dome, Mississippi, 22 October 1964.

Descriptors: (*Underground explosions, Nuclear explosions), (*Nuclear explosions, *Radiological contamination), Gamma rays, Radiation hazards, Radiation monitors, Radiation effects, Radiation injurires, Radioactive fallout, Radioactive waste, Disposal, Health physics, Air pollution, Water pollution, Dose rate, Safety, Dosimeters, Sampling, Environment, Decontamination, Mississippi.

Identifiers: Vela-Uniform, Dribble project, Salmon event.

Radiation measurements were recorded during and after the detonation by a Remote Area Monitoring System. After the detonation, radiation monitors equipped with portable radiation detection instruments surveyed the route into surface ground zero before other planned reentries were made. Continuous surveillance was provided while personnel were in the area. Radiological sciences requirements included the following: (1) Recording measurements of gamma dose rates; (2) Measurements of radionuclide concentrations in air; (3) Measurements of radionuclide concentrations in water; (4) Toxic gas and explosive mixture measurements; (5) Portable instrument measurements of gamma dose rates; and (6) Portable instrument measurements of alpha radiation. Only background radiation measurements were observed from zero time until communication with the cavity was established during postshot drilling operations at a depth greater that 2600 feet. Fifty-two individuals received radiation doses in excess of 100 mrem during the Salmon Event program. The maximum accumulated individual dose was 1065 mrem (well below the dosage limits listed in the AEC manual, chapter 0524, of 3 rem per quarter and 5 rem per year). (Author)

IDO-17174 **Field 18C, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
THE FISSION CROSS SECTION OF 241 PU FROM 20-200 EV AS DETERMINED FROM A NUCLEAR EXPLOSION.
by O. D. Simpson, R. G. Fluharty, M. S. Moore, and A. Hemmendinger. Apr 66, 25p
Contract AT (10-1)-205
Prepared in cooperation with Los Alamos Scientific Lab., Univ. of Calif., N. Mex.

Descriptors: (*Nuclear explosions, Neutron cross sections), (*Nuclear energy levels, Plutonium).

For abstract, see N 20 14.

LA-3439 **Field 18C, 20H**
CFSTI Prices: HC$3.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
GRAPHS OF CALCULATIONS OF ENERGY DEPOSITION AND AIR FLUORESCENCE FROM RADIATION PRODUCED BY A NUCLEAR EXPLOSION IN SPACE.
by E. W. Bennett. Nov 65, 53p
Contract W-7405-eng-36

Descriptors: (*Nuclear explosions, Graphics), (*Photons, X rays).

For abstract, see N 20 14.

PNE-504F **Field 18C, 8K**
CFSTI Prices: HC$0.55 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
STRONG-MOTION SEISMIC MEASUREMENTS. Final rept.
by Lewis J. Cauthen Jr. Sep 65, 31p
Contract W-7405-eng-48
Report on Project Pre-Schooner, Nevada Test Site, February 1964.

Descriptors: (*Nuclear explosions, Seismology), (*Seismology, Instrumentation).

Identifiers: Plowshare.

For abstract, see N 20 14.

PNE-801F **Field 18C, 20K**
CFSTI Prices: HC$3.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Livermore.
SHOCK FRONT STUDIES OF THE HANDCAR EVENT.
by R. E. Marks, and L. A. Rogers. Aug 65, 64p
Contract W-7405-eng-48
Report on Project Handcar.

Descriptors: (*Nuclear explosions, Shock waves), (*Shock waves, Seismology).

Identifiers: Handcar project.

For abstract, see N 20 14.

PNE-913F **Field 18C, 8K**
CFSTI Prices: HC$3.00 MF$0.75
Beers (Roland F.) Inc., Alexandria, Va.
ANALYSIS OF SURFACE SEISMIC DATA.
by Lawrence L. Davis. 7 Dec 65, 60p
Contract AT (29-2)-1163
Report on Project Palanquin.

Descriptors: (*Seismic waves, Nuclear explosions), (*Nuclear explosions, Cratering).

Identifiers: Plowshare project.

For abstract, see N 20 14.

AD-634 830 **See Field 4A**

AD-634 901 **See Field 8G**

AD-635 285 **See Field 17F**

AD-635 477 **See Field 15F**

18D. NUCLEAR INSTRUMENTATION

AD-635 169 **Field 18D**
CFSTI Prices: HC$4.00 MF$0.50
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
A MULTIPLE DETECTOR SYSTEM ADAPTED FOR TOTAL ABSORPTION GAMMA-RAY SPECTROMETRY.
by John C. Saccenti, Robert E. Brady, and John H. McNeilly. Jun 66, 24p NDL-TM-30

Descriptors: (*Nuclear radiation spectrometers, *Crystal detectors), Absorption spectrum.

A total absorption gamma-ray spectrometer system utilizing anticoincidence shielding is described. The multi-detector system consists of a 9.50-inch diameter, 10.0-inch high NaI (T1) crystal annulus which serves as the anticoincidence guard. A 3.31-inch-diameter cylindrical cavity extends completely through, and is symmetric with, the crystal axis. Two additional NaI (T1) crystals are positioned within the annulus cavity; one is r movable for inserting samples. With the anticoincidence shielding, a factor of 6 reduction in the magnitude of the Compton portion of the cesium-137 spectrum can be achieved. For cobalt-60, the maximum reduction factor achievable is 25. For gamma energies less than 3 MeV, background is reduced by a factor of 3.3. Design flexibility permits coincidence, anticoincidence, and sumcoincidence operation. The system has effectively been used as an anticoincidence total absorption spectrometer, in coincidence for positron annihilation studies, and as an integral bias sum spectrometer. (Author)

AD-635 209 **Field 18D**
CFSTI Prices: HC$3.00 MF$0.50
Washington Univ., St. Louis, Mo. Dept. of Physics.
DEVICES FOR DETECTING AND TRACING THE PATHS OF IONIZING PARTICLES.
by Arthur L. Hughes. 31 Jul 66, 9p
Grant DA-ARO (D)-31-124-G427
Projs. DA-20014501BB11B, 3816-P
AROD-3816:2

Descriptors: (*Alpha particle detectors, Performance (Engineering)), (*Ionization chambers, Performance (Engineering)), Sparks, Alpha particles, Particle trajectories, Electrons, Helium, Neon, Sulfur compounds, Fluorides.

Identifiers: Spark chambers, Sulfur hexafluoride.

The performance of spark chambers traversed by heavily ionizing alpha particles from polonium-210 was studied. Bright sparks along the alpha particle tracks were readily obtained up to about 60 degrees with the normal to the electrodes. The densely packed ion-pairs favor the overlapping of the electron avalanches, thereby making it possible for the spark to follow the particle up to wide angles. Experiments were made showing that the addition of 0.1 percent or less of SF6 very greatly reduced the lifetime of the free electrons initiating the electron avalanches. (Author)

NLCO-971 **Field 18D, 11F**
CFSTI Prices: HC$1.00 MF$0.50
National Lead Co. of Ohio, Cincinnati.
DESIGN AND OPERATION OF A VACUUM CATHODIC ETCHING UNIT.
by W. N. Wise. May 66, 16p
Contract AT (30-1)-1156

Descriptors: (*Ion bombardment, Vacuum apparatus), (*Reactor materials, Instrumentation).

Identifiers: Etching.

For abstract, see N 20 14.

PB-169 534 **Field 18D**
CFSTI Prices: HC$4.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
VARIATION DES CONSTANTES DE TEMPES DE FILTRAGE DANS LES PERIODEMETRES LOGARITHMIQUES RESULTATS ET POSSIBILITIES (1964) (The Changers of Time Constant in the Filters of DC Logarithmic Periodmeter - Results and Possibilities (1964)).
by Claude Faraguet, and Robert Quenee. Jan 66, 41p CEA-R-2940
Text in French; Attached Summary in English.

Descriptors: (*Neutron detectors, Time-interval counters), (*Ionization chambers, Time-interval counters), (*Time-interval counters, Filters (Electromagnetic wave)), Logrithmic amplifiers, Direct current, Pulse counters, Circuits, France.

Identifiers: Periodmeters.

The optimum transfer function for a DC logarithmic periodmeter shows that it is necessary to choose the time constant of the filters in accordance with the amount of information given by the neutron detector, if it is desirable to obtain short response time. Theoretical and experimental results of a DC logarithmic periodmeter using a filter with time constants with level of the DC output signal of the logarithmic amplifier are given when an DC ionization chamber is used. Theoretical

results are also given when a neutron pulse detector is used. A prototype of a periodmeter is also described. (Author)

AD-635 162 See Field 4A

ANL-6953 See Field 7E

BNWL-241 See Field 8K

CEX-65.01 See Field 6R

IDO-17140 See Field 18H

PB-169 499 See Field 13B

PB-169 908 See Field 13B

PB-170 543 See Field 18J

PB-170 544 See Field 18J

PB-170 545 See Field 18J

18F. RADIATION SHIELDING AND PROTECTION

AD-635 279 **Field 18F**
CFSTI Prices: HC$4.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
PROBLEMS OF DOSIMETRY AND RADIATION SHIELDING (SELECTED ARTICLES).
16 Feb 66, 32p FTD-MT-65-30
TT-66-61689
Edited machine trans. of Inzhenerno-Fizicheskii Institut (USSR) v2 p28-39, 66-77 1963.

Descriptors: (*Gamma rays, *Shielding), Distribution functions, Concrete, Aluminum, Iron, Lead, USSR.

Contents: Experimental investigations of distribution functions of point monodirected sources with initial gamma-quanta energy of 0.661 and 1.25 Mev in concrete, aluminum, iron, and lead, by L. R. Kimel', A. M. Panchenko, V. I. Polyakov, and V. P. Terent'yev: The spectral-angular distribution of gamma-radiation from the surface of a half-medium with evenly distributed isotropic sources, by V. V. Pavlov.

AD-635 303 **Field 18F**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE.
by R. E. Maerker, and F. J. Muckenthaler. 5 Apr 66, 29p ORNL-TM-1421

Descriptors: (*Shielding, Concrete), (*Concrete, *Albedo), (*Thermal neutrons, Albedo), Neutron beams, Nuclear scattering, Neutron capture gamma rays, Monte Carlo method.

Single-velocity Monte Carlo calculations and measurements were performed to determine the differential angular thermal-neutron albedos for a reinforced concrete from monodirectional beams of incident thermal neutrons. Preliminary calculations using a statistical estimation technique indicate up to 50 scatterings should be followed for each neutron in order to produce good estimates of the differential albedos, and up to 100 scatterings to produce good estimates of the capture gamma-ray differential dose albedos. Deviation between experiment and calculation can be reduced to an average of 5.1% for 72 points of comparison if an anisotropic scattering law for water deduced from earlier Argonne National Laboratory measurements is assumed. (Author)

18G. RADIOACTIVE WASTES

Y-1502 See Field 7A

18H. RADIOACTIVITY

AD-635 088 **Field 18H, 7E, 20L, 11F K**
CFSTI Prices: HC$5.00 MF$1.00
Aerospace Technology Div., Library of Congress, Washington, D. C.
RADIATION DAMAGE IN SOLIDS: COMPILATION OF ABSTRACTS.
ATD work assignments 79, 94, Task 39.
by J. Andrushis, and C. Shishkevish. 18 Apr 66, 194p ATD-66-43
TT-66-61659
Based on Soviet-Satellite open sources pub. 1962-1965. Report on surveys of Communist World Scientific and Technical Literature.

Descriptors: (*Radiation damage, Solids), Abstracts, Semiconductors, Metals, Alloys, Polymers, Lubricants, Calcium compounds, Ceramic materials, Alkali metal compounds, Halides, Ruby, Quartz, Sulfates, Dielectrics, USSR.

The report covers radiation damage to: semiconductors, metals and alloys, polymers, low-molecular-weight compounds, lubricants, ceramics, alkali halides, ruby, calcium fluoride, Rochelle salt, quartz, glycine sulfate, devices and components, and insulating materials.

AD-635 252 **Field 18H, 20H**
CFSTI Prices: HC$4.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
ENERGY LEVELS OF IODINE-127.
by John P. Hurley, and James M. Mathiesen. 20 Jul 66, 39p USNRDL-TR-1019

Descriptors: (*Iodine, *Nuclear energy levels), Tellurium, Radioactive decay, Decay schemes, Gamma emission, Nuclear spins, Parity, Radiation measurement systems, Radioactive isotopes.

Gamma-ray singles and coincidence measurements were made on the radiations from the Tellurium-127m, Tellurium-127 to Iodine-127 decay sequence. Gamma-ray intensities were measured, log ft values were computed, and spin-parity assignments were made to the energy levels of Iodine-127. A decay scheme is proposed on the basis of previous and present data. (Author)

ANL-6962 **Field 18H, 18I, 18J, 18L**
CFSTI Prices: HC$6.00 MF$1.50
Argonne National Lab., Ill.
EXPERIMENTS WITH PERIPHERAL SUPERHEATER CORE PSH-1, BORAX-V.
by R. E. Rice. Jul 65, 287p
Contract W-31-109-eng-38

Descriptors: (*Reactor cores, Reactor reactivity), (*Borates, Sodium compounds).

For abstract, see N 20 14.

CEX-59.4.23 **Field 18H, 8G, 6R**
CFSTI Prices: HC$1.00 MF$0.50
Geological Survey, Washington, D. C. Division of Biology and Medicine (AEC), Washington, D. C.
AERORADIOACTIVITY SURVEY AND AREAL GEOLOGY OF PARTS OF OHIO AND INDIANA (ARMS-I).
by Robert G. Bates. Jun 64, 19p
Prepared in cooperation with Division of Biology and Medicine (AEC), Washington, D. C.

Descriptors: (*Radiobiology, Ohio), (*Health physics, Indiana).

For abstract, see N 20 14.

DP-1014 **Field 18H**
CFSTI Prices: HC$3.00 MF$0.75
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
CRITICAL AND SAFE MASSES AND DIMENSIONS OF LATTICES OF U AND UO2 RODS IN WATER.
by Hugh K. Clark. Feb 66, 60p CONF-651103-29
Contract AT (07-2)-1
Prepared for presentation at IAEA Symposium on Critically Control of Fissile Materials, Stockholm (Sweden).

Descriptors: (*Reactor lattice parameters, Reactor materials), (*Reactor fuel rods, Reactor lattice parameters).

For abstract, see N 20 14.

IDO-17140 **Field 18H, 6R, 18D, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
NUCLEAR TECHNOLOGY BRANCHES QUARTERLY REPORT, APRIL 1-JUNE 30, 1965.
Mar 66, 126p
Contract AT (10-1)-205

Descriptors: (*Reactor lattice parameters, Reactor fuels plates), (*Reactor shutdown, Reactor lattice parameters).

For abstract, see N 20 14.

AD-635 198 See Field 9A

AD-635 218 See Field 9A

AD-635 228 See Field 20L

PB-170 545 See Field 18J

18I. REACTOR ENGINEERING AND OPERATION

AD-635 041 **Field 18I**
CFSTI Prices: HC$6.00 MF$1.25
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE MAXIMUM FUEL ELEMENT LOADING OF THE AIR FORCE NUCLEAR ENGINEERING TEST FACILITY.
Master's thesis.
by Phillip Arthur Terry. Mar 66, 205p GSP/PH/66-19

Descriptors: (*Thermal reactors, Reactor operation), (*Fuel burn up, Reactor cores), Air Force research, Reactor fuel elements, Test facilities, Nuclear engineering, Mathematical models, Reactor reactivity, Thermal stresses, Reactor materials, Programming (Computers).

The maximum fuel element loading for the third core of the Air Force Nuclear Engineering Test Facility at Wright-Patterson Air Force Base, Ohio, was calculated. The effects of several fuel element loadings were evaluated using a two-dimensional, burn-up code on the 7094 computer. The criteria used in the evaluation were limits on the excess reactivity, the thermal stress, and the materials of the reactor. The 250 gm fuel element loading was found to be the maximum fuel element loading for the third core. (Author)

AGN-TM-415 **Field 18I, 18J, 18L**
CFSTI Prices: HC$6.00 MF$1.25
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. ML-1-II FUEL ELEMENT DESIGN REPORT.
by R. E. Soulis, W. F. English, and L. A. Kimura. Jan 66, 223p
Contract AT (10-1)-880

Descriptors: (*Reactor fuel elements, Gas-cooled reactors), (*Gas-cooled reactors, Reactor system components).

For abstract, see N 20 14.

ANL-7049 **Field 18I**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
SAFETY ANALYSIS OF THE OPERATION OF ZPR-3 WITH FUEL LOADINGS UP TO 430 KG OF PLUTONIUM.
by J. K. Long, L. R. Kelman, R. L. McVean, and F. W. Thalgott. Dec 65, 22p
Contract W-31-109-eng-38

Descriptors: (*Reactor safety systems, Reactor operation), (*Reactor fuels, Plutonium).

For abstract, see N 20 14.

BNL-954 **Field 18I, 18K**
CFSTI Prices: HC$5.00 MF$1.00
Brookhaven National Lab., Upton, N. Y.
NUCLEAR ENGINEERING DEPARTMENT ANNUAL REPORT, DECEMBER 31, 1965.
31 Dec 65, 182p
Contract AT-30-2-GEN-16

Descriptors: (*Nuclear engineering, Reports), (*Nuclear physics laboratories, Scientific research).

For abstract, see N 20 14.

IDO-17126 **Field 18I, 18J, 18N**
CFSTI Prices: HC$3.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
STEP PROJECT.
Quarterly technical rept. Jan-March 65.
by H. D. Curet. Mar 66, 59p
Contract AT (10-1)-205

Descriptors: (*Reactor cores, Performance (Engineering)), (*Auxiliary power plants, Reactor hazards).

Identifiers: Step project.

For abstract, see N 20 14.

IDO-17145 **Field 18I, 18J, 18L, 11F**
CFSTI Prices: HC$4.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
STEP PROJECT.
Quarterly technical rept., Apr-Jun 65.
by K. A. Dietz. May 66, 115p
Contract AT (10-1)-205

Descriptors: (*Auxiliary power plants, Reactor kinetics), (*Reactor fuel elements, Fission products).

Identifiers: Step project.

For abstract, see N 20 14.

IDO-28653 **Field 18I, 18J, 18L, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM.
Progress rept. for 1 Jul-31 Oct 65.
Jan 66, 77p
Contract AT (10-1)-880

Descriptors: (*Gas-cooled reactors, Military requirements), (*Nuclear power plants, Mobile).

For abstract, see N 20 14.

NAA-SR-11175 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park., Calif.
STARTUP AND OPERATION OF THE ONE-MEGAWATT SHIELD TEST AND IRRADIATION REACTOR.
by K. G. Randen, and K. G. Golliher. 25 Mar 66, 40p
Contract AT (11-1)-Gen-8

Descriptors: (*Reactor start-up sources, Reactor operation), (*Reactor lattice parameters, Reactor cores).

ORNL-NSIC-11 **Field 18I**
CFSTI Prices: HC$4.00 MF$0.75
Oak Ridge National Lab., Tenn.
1965 COMPILATION OF UNITED STATES NUCLEAR STANDARDS, 2ND EDITION, 1965.
by Wm. B. Cottrell. Dec 65, 94p
Contract W-7405-eng-26

Descriptors: (*Nuclear safety systems, Standards), (*Nuclear engineering, Standards).

For abstract, see N 20 14.

ORNL-NSIC-15 **Field 18I**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
THE INTEGRITY OF REACTOR PRESSURE VESSELS.
by E. C. Miller. May 66, 61p
Contract W-7405-eng-26

Descriptors: (*Pressure vessels, Nuclear reactors), (*Nuclear power plants, Pressure vessels).

For abstract, see N 20 14.

PB-169 461 **Field 18I**
CFSTI Prices: HC$5.60 MF$0.50
Institutt for Atomenergie, Kjeller (Norway).
PREBOLO. DESCRIPTION OF THE HIGH PRESSURE BOILING LOOP AT KJELLER.
by E. Kjelland-Fosterud. Aug 65, 54p KR-98

Descriptors: (*Reactor systems components, Models (Simulations)), (*Heat exchangers, Reactor systems components), Test equipment, Design, Mechanical drawings, Instrumentation, Temperature sensitive elements, Reactor coolants, Water, Boiling, Pressure, Condensers (Liquefiers), Control systems, Operation, Norway.

Identifiers: Prebolo, Reactor loops.

The high pressure boiling loop in the Engineering Laboratory at Kjeller is described. The report is intended to serve as a reference report, to avoid having to include a full description of the loop in later reports giving experimental results. The overall design is given as well as assembly drawings of the major components. The experimental programmes are stated in sufficient detail to justify the design. The instrumentation is fully reviewed, especially the temperature measuring equipment. The capacity of the heat exchanger is regulated by the rate of flow of cooling water which is admitted, and this evaporates partially. Due to this design the heat removed in the condenser and subcooler cannot be measured on the secondary side, and a reliable and accurate temperature measurement procedure is therefore essential. The operation and staffing of the loop is briefly described. (Author)

ANL-6962 **See Field 18H**

NAA-SR-11202 **See Field 14B**

WAPD-TM-414 **See Field 9B**

18J. REACTOR MATERIALS

ANL-7075 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
NUCLEAR-FUEL-ELEMENT LOADING BY VIBRATORY COMPACTION - URANIUM-PLUTONIUM CARBIDE SPECIMENS FOR EBR-II IRRADIATION.
by J. E. Ayer, F. E. Soppet, and G. J. Talaber. Feb 66, 17p
Contract W-31-109-eng-38

Descriptors: (*Reactor fuel elements, Loading (Mechanics)), (*Vibrators (Mechanical), Material forming).

For abstract, see N 20 14.

BNL-980 **Field 18J, 18L, 20M**
CFSTI Prices: HC$2.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW.
A Biomonthly technical progress review, Volume 4, Number 1.
Feb 66, 44p
Contract AT (30-2)-GEN-16

Descriptors: (*Liquid metals, High-temperature research), (*Nuclear power plants, Heat transfer).

For abstract, see N 20 14.

DP-1019 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
IRRADIATION TESTS OF URANIUM METAL TUBES FOR D20-COOLED REACTORS.
by Stephen R. Nemeth. Feb 66, 65p
Contract AT (07-2)-1

Descriptors: (*Reactor fuel elements, Test reactors), (*Power reactors, Reactor fuel elements).

For abstract, see N 20 14.

GAT-524 **Field 18J, 7A**
CFSTI Prices: HC$1.00 MF$0.50
Goodyear Atomic Corp., Piketon, Ohio.
THE SEPARATION AND MICROANALYSIS OF NIOBIUM, TANTALUM, TITANIUM, VANADIUM, AND ZIRCONIUM APPLICATION TO URANIUM COMPOUNDS.
by O. A. Vita. 18 Mar 66, 12p CONF-651004-15
Contract AT (33-2)-1
Prepared for presentation at Conference on Analytical Chemistry in Nuclear Technology (9th), Gatlinburg, Tenn.

Descriptors: (*Reactor materials, Uranium compounds), (*Uranium compounds, Solvent extraction).

For abstract, see N 20 14.

ORNL-3947 **Field 18J, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
OXIDATION OF UNFUELED AND FUELED GRAPHITE SPHERES BY STEAM.
by J. L. Rutherford, J. P. Blakely, and L. G. Overholser. May 66, 37p
Contract W-7405-eng-26

Descriptors: (*Graphite, Spheres), (*Oxidation, Steam).

For abstract, see N 20 14.

PB-170 543 **Field 18J, 18D, 20H**
CFSTI Prices: HC$9.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
EFFET DU RAYONNEMENT GAMMA DU COBALT 60 ET DES NEUTRONS THERMIQUES SUR DU SICILIUM P ET N DE HAUTE RESISTIVITE. POSSIBILITE DE REALISER UNE COMPENSATION NUCLEAIRE D'UN SILICIUM

DE TYPE P (Effect of Cobalt-60 Gamma Radiation and of Thermal Neutrons on High Resistance P and N Silicon. Possibility of Obtaining a Nuclear Compensation for P Type Silicon).
Doctoral thesis in French,
by Jean Messier. 1965, 96p CEA-R-2918
Text in French; Attached Summary in English.

Descriptors: (*Radioactive isotopes, Cobalt), (*Gamma rays, Silicon), Thermal neutrons, Reactor materials, Impurities, Annealing, Life expectancy, Crystal lattice defects, Radiation measurement systems, Elementary particles, Neutron detectors, Radiation damage.

PB-170 544 **Field 18J, 18D, 12B**
CFSTI Prices: HC$7.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDES SUR LA METHODE GAMMA-GAMMA. DETERMINATION D'UN APPAREILLAGE POUR LA MESURE EN PLACE DE LA DENSITE DES MINERAIS D'URANIUM (Studies on the Gamma-Gamma Method. Definition of an Apparatus for On-The-Spot Measurement of Uranium Ore Densities),
by J. A. Czubek, and Jean Guitton. Apr 66, 72p CEA-R-2919
Text in French; Attached summary in English.

Descriptors: (*Gamma rays, Probes) (Electromagnetic)), (*Reactor materials, Density), Uranium, Ores (Metal sources), Gamma ray scattering, Mathematical models, Curve fitting, Simultaneous equations, Graphite, Errors, Calibration, Radioactivity, Reactor shielding calculations, Radiation measurement systems.

The research published in report CEA-R 2720 (PB-167 960) in March 1965 is continued and includes: experimental results obtained with a model composed of a constant density material (graphite); the drawing-up of calibration curves using the similitude principle; and determination of the characteristics of a gamma-gamma probe, together with a discussion. The influence is studied of a certain number of parameters on the shape of the energy spectra of scattered radiation, and of the calibration curves: nature of the radio-active source, diameter of the probe area, source detector distance, geometrical shape of shielding between the source and the detector. An attempt is made to find a mathematical model for the calibration curve, for given conditions. Numerical applications make it possible to establish the optimum technical characteristics for a probe measuring the density with the smallest statistical error.

PB-170 545 **Field 18J, 18H, 18D**
CFSTI Prices: HC$3.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
NOUVELLES MESURES DANS LE SPECTRE D'EMISSION L DU PLUTONIUM AU MOYEN D'UN MICRO-ANALYSEUR A SONDE ELECTRONIQUE (New Measurements in Plutonium L X Ray Emission Spectrum Using an Electron Probe Micro-Analyser).
by Jean-Louis Bobin, and Jean Despres. Apr 66, 31p CEA-R-2921
Text in French; Attached summary in English.

Descriptors: (*Plutonium, Radioactivity), (*X-ray spectrum, Plutonium), Reactor materials, Instrumentation, Radiation measurement systems, Probes (Electromagnetic), Microanalysis, Emissivity, X rays.

Further studies by means of an electron-probe micro-analyser, allowed report CEA-R 1798 authors to set up a larger plutonium X ray spectrum table. Measurements of plutonium LII and LIII levels excitation potentiels have also been achieved. Some remarks about apparatus performance data (such as spectrograph sensibility, resolving power and accuracy) will be found in the appendix.

USBM-RC-1232 **Field 18J, 11F, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Albany, Oreg. Metallurgy Research Center.
QUARTERLY METALLURGY PROGRESS REPORT NO. 30, JANUARY 1-MARCH 31, 1966.
31 Mar 66, 19p
Contract AT (11-1)-599

Descriptors: (*Carbides, Material forming), (*Reactor materials, Mechanical working).

For abstract, see N 20 14.

AGN-TM-415 **See Field 18I**

ANL-6962 **See Field 18H**

IDO-17126 **See Field 18I**

IDO-17145 **See Field 18I**

IDO-28653 **See Field 18I**

RFP-679 **See Field 11F**

WCAP-6068 **See Field 7E**

18K. REACTOR PHYSICS

AD-634 843 **Field 18K, 20J**
CFSTI Prices: HC$2.00 MF$0.50
Uppsala Univ. (Sweden). Quantum Chemistry Group.
NEUTRON IMPORTANCE AND VARIATIONAL FORMULATION IN REACTOR PHYSICS,
by Reikichi Nozawa. 25 Feb 66, 48p Scientific-7
Contract AF 61 (052)-874
ARL-66-0120

Descriptors: (*Neutron density, Mathematical analysis), (*Reactor operation, Neutron flux), Neutron transport theory, Integration, Integral equations, Perturbation theory, Green's function, Sweden.

Identifiers: Neutron importance.

The neutron importance is studied as a physical concept for a time-dependent system considering the case where successive detections are made as well as the final detection. Successive detections make the importance equation inhomogeneous. Based on the physical interpretation of neutron importance, a new formulation of variational principles are proposed in a manner applicable to time-dependent systems. The proposed variational functionals are to be understood not as Lagrangian densities as in classical or quantum theory of fields but as total detection data in experiments. As an application, a method of Green's functions is developed to improve successively a trial flux. The modification factor for the source term in the diffusion equation is derived in a most elementary way. (Author)

AD-635 085 **Field 18K**
CFSTI Prices: HC$2.00 MF$0.50
Armed Forces Radiobiology Research Inst., Bethesda, Md.
THE NUMERICAL EVALUATION OF THE THEORETICAL VARIANCE/MEAN RATIO OF THE NEUTRON POPULATION IN THE SUBCRITICAL CONDITION OF THE AFRRITRIGA REACTOR.
Technical note,
by Horace Schow II. Jan 66, 27p AFRRI-TN66-1

Descriptors: (*Research reactors, *Neutron flux), Neutrons, Numerical analysis, Neutron lifetime, Statistical analysis, Stochastic processes.

The numerical evaluation of the theoretical variance/mean ratio of the neutron population in the subcritical condition of the AFRI-TRIGA reactor is given for (1) the case of no delayed neutron grous; (2)the case of one equivalent delayed neutron group; and (3) the case of six delayed neutron groups. The Courant-Wallace equations were solved to obtain the theoretical variance/mean ratio using the mean prompt neutron lifetime of 0.000039 seconds in the AFRRI-TRIGA reactor. (Author)

AD-635 160 **Field 18K**
CFSTI Prices: HC$3.00 MF$0.75
Columbia Univ., New York. Plasma Lab.
CRITICAL MASS CALCULATIONS FOR COAXIAL AND VORTEX FLOW GASEOUS CORE REACTORS.
by Gunter W. Tumm. Apr 66, 98p Rept. no. 26
Contracts AF 49 (638)-1254, AF 49 (638)-1634
AFOSR-66-1176

Descriptors: (*Nuclear reactors, Critical assemblies), (*Reactor lattice parameters, Nuclear reactors), Temperature, Fluid mechanics, Resonance.

Identifiers: Gaseous core reactors.

Design point critical masses are calculated for two configurations of a gaseous core reactor. A new set of resonance and thermal cross sections, developed for this purpose, was used. The following effects and their influence on the critical mass are investigated: The relative position of the fuel region: The presence of hydrogen within the reactor cavity; The reactor operating temperature; The length-to-diameter ratio of the reactor; The presence of a nozzle; A simplified fuel density distribution; and The pressure vessel. For an optimum reactor geometry (corresponding to minimum critical mass) the critical mass of a 'vortex flow' gaseous core reactor is five times smaller than the critical mass of the 'coaxial flow' reactor. (Author)

AD-635 232 **Field 18K, 21F**
CFSTI Prices: HC$6.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
Sn TRANSPORT CALCULATIONS FOR A GASEOUS CORE REACTOR.
Master's thesis.
by Carl F. Bloemker. Mar 66, 104p GSP/PH/66-1

Descriptors: (*Nuclear reactors, *Neutron transport theory), (*Numerical analysis, Neutron transport theory), Programming (Computers), Reactor lattice parameters, Space propulsion, Nuclear propulsion.

Identifiers: Theses.

A nuclear analysis was performed on a gaseous core cavity reactor suitable for space propulsion. The reactor analyzed consisted of a spherical gaseous core reactor surrounded by a carbon Beryllium reflector. To carry out this analysis, the angular segmentation (Sn) method was applied to the conservative form of the Boltzmann Equation to obtain a set of finite difference equations. The finite difference equations were then incorporated into a computer code written by the author. The computer code was programed for the IBM 7094 coupled system using Fortran IV. The code was first applied to an idealized gas core reactor which was previously analyzed by T. F. Plunckett using sixteen group diffusion theory. The difference in critical mass was 8%. After this check on the reliability of the author's code, a parametric study on the gaseous core reactor was performed. The results of this study, which determined the critical mass as a function of core radii and design thrust, are presented. (Author)

PB-169 541 **Field 18K**
CFSTI Prices: HC$5.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.

CODE ORHEX (DEP 053 S). RESOLUTION DES EQUATIONS DE LA DIFFUSION A DEUX GROUPES DANS UNE GEOMETRIE HEXAGONALE. (The ORHEX Code (DEP 053 S). Resolution of Two-Group Scattering Equations in Hexagonal Geometry),
by Jean-Paul Bayard, Andre Guillou, Ginette Guillou, and Theresa Lena. Feb 66, 60p CEA-R-2977
Text in French; Attached Summary in English.

Descriptors: (*Graphite moderated reactors, Nuclear scattering), (*Nuclear scattering, Programming (Computers)), Neutron flux, Geometric forms, Equations, Nuclear cross sections, Numerical analysis, Iterative methods, Polynomials, France.

Identifiers: ORHEX program.

ORHEX is a code which was drawn up for the IBM-7094 computer. It can solve two-group scattering equations (by calculating the neutron fluxes and the proper value of k-eff) for a two-dimensional hexagonal geometry. It is assumed that the cross-section of the reactor under consideration can be represented by a juxtaposition of regular homogeneous hexagons; this set-up is particularly well adapted to graphite-type reactors. The equations are solved by alternating exterior iterations in the case of the proper value (acceleration using Tchebycheff's polynomial method) and internal iterations in the case of flux calculations (over-relaxation by blocks). (Author)

ANL-7133 See Field 20H

BNL-954 See Field 18I

IDO-17077 See Field 18N

IDO-17173 See Field 20H

18L. REACTORS (POWER)

AGN-TM-415 See Field 18I

ANL-6962 See Field 18H

BNL-980 See Field 18J

IDO-17145 See Field 18I

IDO-28653 See Field 18I

18N. SNAP TECHNOLOGY

IDO-17077 **Field 18N, 18K**
CFSTI Prices: HC$6.00 MF$1.25
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
QUARTERLY TECHNICAL REPORT STEP PROJECT, JULY 1964-SEPTEMBER 1964, OCTOBER 1964-DECEMBER 1964.
Research and development rept.
by K. A. Dietz, E. W. Mellow, and N. E. Pace. Mar 66, 222p
Contract AT (10-1)-205

Descriptors: (*Reactor kinetics, Reactor fuel clodding), (*Auxiliary power reactors, Reactor accidents).

Identifiers: Step project.

For abstract, see T 66 16.

IDO-17126 See Field 18I

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-634 978 **Field 19A**
CFSTI Prices: HC$1.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa.
DIGITAL COMPUTER SIMULATION OF BALLISTICALLY OPERATED HIGH-LOW SYSTEMS.
Technical research rept.,
by Leonard A. DeStefano. May 66, 27p FA-M66-22-1
SEG-TR-66-14

Descriptors: (*Cartridges (PAD), Simulation), Digital computers, Ballistics, Programming (Computers), Design, Optimization, Pressure vessels, Propellants.

The report presents a digital computer simulation of the performance of high-low propellant actuated devices. The equations describing these devices are presented and solved simultaneously by 4th order Runge Kutta methods programmed in Fortran for the Univac Solid State 90 digital computer. The computer program, its input-output formats, and a comparison between experimental and computed performance are also presented. The results of this comparison indicate that this program adequately simulates the performance of ballistically operated high-low devices and, therefore, may be used as an efficient tool to aid in their design and in the estimation of their performance. (Author)

AD-635 007 **Field 19A, 10A**
CFSTI Prices: HC$3.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa. Propellant Actuated Devices Div.
NEW FUNDAMENTAL MECHANISM FOR AN ENERGY CONVERSION DEVICE.
Technical research rept. 1 Jul 62-31 Jul 65.
by Frank T. Pisano. Apr 66, 57p
FA-R-1812

Descriptors: (*Cartridges (Pad), *Energy conversion), Pneumatic systems, Hydraulic systems, Power equipment.

This report summarizes the theoretical and experimental studies conducted on a hot gas motor, a fundamentally new mechanism, as an energy conversion device. In the theoretical study, the relationship of the working components was determined and optimized for maximum conversion of fluid potential and kinetic energy into useful mechanical work. A test model of the hot gas motor was fabricated and a limited series of test runs was conducted, using both cold and hot gas. This report also presents a design discussion, a vector analysis, and test data of this novel motor. (Author)

PB-169 806 **Field 19A**
CFSTI Price: HC$3.60
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF JETS FROM SCALED CONICAL SHAPED CHARGE LINERS.
Memo. rept.
by R. DiPersio, J. Simon, and T. H. Martin. Aug 60, 33p BRL-MR-1298
Projs. DA-5B03-04-009, TB3-0134
AD-246 352

Descriptors: (*Jets, Cavity liners), (*Shaped charges, Jets), (*Cavity liners, Jets), Radiography, Copper, Particles.

Triple flash radiographs of jets from three scaled shaped charges containing copper cones with apex angle of 42degrees and analyzed. The performance of jet particles was determined by numbering particles as shown on time sequenced radiographs, and obtaining their velocity. Penetration characteristcs of jets in terms of the action of these discrete particles are descirbed. (Author)

AD-635 211 See Field 19H

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-634 802 **Field 19D, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Lehigh Univ., Bethlehem, Pa. Inst. of Research.
MATHEMATICAL AND EXPERIMENTAL INVESTIGATION OF THERMAL INITIATION OF EXPLOSION.
Progress rept. 1 Jan-31 Mar 66,
by Fred P. Stein. 1 Apr 66, 2p
Contract DA-28-017-AMC-1090 (A)
Proj. DA-1C010501-A007
See also AD-619 297.

Descriptors: (*Explosions, Kinetic theory), Heaters, Vibration, Tests, Transformers, Explosives initiators, Furnaces, Thermodynamics.

The lead azide reaction chamber was mounted inside the aluminum block, which is the core of the constant-temperature furnace, and tests were run to determine the constancy of temperature inside this furnace. The aluminum block is heated by 24 heaters which are grouped into three zones-two end zones and a central zone. Each zone of heaters has its individual variable transformer so that the power input to each zone may be individually adjusted. Each zone transformer is connected to the main transformer, which is controlled by the Bayley temperature controller. Tests have shown that, for periods up to a week in duration, temperature variations in the center of the furnace could not be detected (Measurements on a 5-15 mv strip-chart recorder). These furnace temperatures are, of course, merely the environment for the reaction chamber which will have its own heater and temperature controller for more precise control. Steps are being taken to isolate the motors and to modify the balance mounting to alleviate the vibrations. (Author)

AD-635 089 **Field 19D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
COMPARISON OF THE UNDERWATER POWER OF EXPLOSIVES IN SMALL CHARGES. X. DEVELOPMENT OF IMPROVED TEST PROCEDURES,
by Donna Price, Charles R. Niffenegger, and Thomas B. Heathcote. 1 Jun 66, 24p NOLTR-66-73
Task RMMO-62-058/212-1/F008-08-11

Descriptors: (*Underwater explosions, Power), (*Explosive materials, Underwater explosives), Pentolite, TNT, RDX, Aluminum, Powder metals, Charges (Explosions), Boosters, Test methods.

Identifiers: Aluminized explosives, HBX.

Pentolite, HBX-1, and two other aluminized explosives were used to evaluate proposed improvements in the procedures for underwater evaluation of small charges. The study revealed the existence of a boostering problem in firing 1-lb charges of the secondary standard, HBX-1, and relation between lowered underwater output and lowered shock sensitivity. The several cases of failure to exhibit maximum underwater output seem to result chiefly from inadequacy of the boostering system used. However, the possible existence of a charge size effect on the shock wave energy needs additional study. A revised procedure for underwater evaluation of 1-lb charges is presented. Its main features are the use of pressed charges (ca. 90% TMD), wherever possible, and of a truncated conical booster which covers the entire surface of the shocked face of the test charge cylinder. The revisions were made chiefly to obtain stronger boostering, but should also improve reproducibility of the experimental charges. (Author)

AD-635 274 **Field 19D, 21B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
CALCULATION OF THE STATE OF PRODUCTS OF EXPLOSION BY THE METHOD OF MEASUREMENT OF PARAMETERS OF SHOCK.
by L. N. Pyatnitskii, and O. A. Tsukhanova. 17 Jan 66, 16p FTD-MT-65-183
TT-66-61686
Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) v5 n5 p21-9 1962.

Descriptors: (*Combustion products, *Methane), Oxygen, Heat transfer, Thermodynamics, Explosions, USSR, Shock waves, Explosion gases.

A method is presented for the investigation of the state of combustion products in a closed pipe, by which the relationship between parameters of combustion products of the mixture $CH4 + 4O2$ and the coefficient of heat transfer on the one hand and time on the other can be calculated. The law is established of the heat transfer between a gas and the wall of a pipe during nonstationary flow of gas, characteristic for conditions of the experiment, which does not differ greatly from the law described for stationary flow. It is shown that in the conditions of the experiment, where there is a sharp change in the parameters of a gas, the system reaches a state of thermodynamic equilibrium in time of the order of 0.001 seconds. Equilibrium begins to be lost in a time of the order of 0.0001 seconds. (Author)

AD-635 482 **Field 19D, 13H, 11F**
CFSTI Prices: HC$4.00 MF$0.75
Titanium Metals Corp. of America, Toronto, Ohio.
THE EFFECT OF DEFORMATION PROCESSING ON THE MECHANICAL PROPERTIES OF Ti-6A1-4V FOR ARMOR.
Final rept.
by D. L. Day, R. G. Broadwell, and J. L. Sliney. Jun 66, 96p
Contract OI-19-066-A4-05852 (Z)
AMRA-CR-66-06-F

Descriptors: (*Titanium alloys, *Armor plate), (*Deformation, Titanium alloys), Mechanical properties, Terminal ballistics, Aluminum alloys, Vanadium alloys, Forging, Rolling (Metallurgy), Heat treatment, Fracture (Mechanics), Toughness, Microstructure, Annealing.

Identifiers: Fracture toughness, Titanium alloy 6Al 4V.

An investigation was made to delineate the effects of deformation processing at variable interstitial content, and thermal treatment on the laboratory mechanical properties and ballistic performance of 5/8 in. thick Ti-6A1-4V armor plate. Attempts were made to correlate the effects of laboratory fracture toughness test with ballistic data. In total, this analysis tried to confirm the primary, chemical and metallurgical effects as noted above under the controlled conditions of a systematic study. (Author)

AD-634 777 **See Field 4B**

AD-635 014 **See Field 16B**

AD-635 115 **See Field 4B**

AD-635 159 **See Field 21B**

19E. FIRE CONTROL AND BOMBING SYSTEMS

AD-634 917 **Field 19E, 20E**
CFSTI Prices: HC$4.00 MF$1.00
Kollsman Instrument Corp., Elmhurst, N. Y.
LASER APPLICATION AVIATION ORDNANCE STUDY.
Final technical rept.,
by Mark Steinhacker. Mar 66, 132p
Contract N61339-1867
Proj. 1867
NAVTRADEVCEN-1867-1

Descriptors: (*Lasers, *Gunnery trainers), (*Weapon systems, Simulation), Naval aircraft, Ordnance, Training devices, Safety.

A laser system applicable to airborne and ground weapon simulation training missions was developed and demonstrated. A full range weapon simulation system was designed in sufficient detail to allow fabrication of a demonstration system. The laser head assembly of this system, which is an Yttrium Aluminum Garnet (YAG) unit operating at 1.065 microns and ten pulses per second continuous, was subjected to complete operational environmental tests. It was demonstrated to be capable of exceeding the requirements of MIL-E-5400, MIL-E-5272, MIL-STD-810. The unit was shown to operate under longitudinal shocks of 650 g's. A self-contained silicon photodetector operating at maximum range signal levels was used to monitor all tests. Eye safety was thoroughly investigated and safe operational procedures are given. Recommendations for future laser weapon simulator effort are included. (Author)

19F. GUNS

PB-169 595 **Field 19F**
CFSTI Prices: HC$59.50
Catholic Univ. of America, Washington, D. C.
INTERIOR BALLISTICS.
by M. E. Serebryakov. 1946, 599p
Contract NOrd-10260
TT-66-60833
Trans. of Unidentified Russian article.

Descriptors: (*Interior ballistics, Guns), (*Artillery, Interior ballistics), USSR.

For abstract, see T 66 16.

19H. UNDERWATER ORDNANCE

AD-635 211 **Field 19H, 19A**
CFSTI Prices: HC$1.50 MF$0.50
Naval Weapons Lab., Dahlgren, Va.
AN INVESTIGATION OF THE EFFECTS OF HYDROSTATIC PRESSURE ON CARTRIDGE ACTUATED DEVICES.
Technical memo.
by T. J. Nock. Jun 66, 30p T-8/66

Descriptors: (*Explosive actuators, *Underwater equipment), (*Cartridges (PAD), Underwater equipment), Hydrostatic pressure, Simulation, Mathematical models, Analog computers, Marine engineering.

The effect of hydrostatic pressure on the operation of cartridge actuated devices in the hydrosphere is explored by means of an analytical model and a numerical example computed by the model. The analog computer program for the example is included. The study indicates that hydrostatic pressure may set the limiting depth to which devices of the type considered can perform useful work in the hydrosphere. The need for further work is indicated in the area of the effects of hydrodynamic drag. The model should be verified by actual underwater tests. (Author)

20A. ACOUSTICS

AD-634 788 **Field 20A, 9A, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Forsvarets Forskningsinstitutt, Kjeller (Norway).
ACOUSTIC AMPLIFICATION - A DISCUSSION OF APPLICATIONS.
Interim scientific rept. no. 11,
by Kjell Blotekjaer. 15 Jan 66, 43p E-74
Contract AF 61 (052)-484

Descriptors: (*Amplifiers, Ultrasonic radiation), (*Piezoelectric crystals, Amplifiers), Semiconductors, Electroacoustic transducers, Delay lines, Gain, Bandwidth, Acoustics, Performance (Engineering), Acoustic equipment.

Based on the present theoretical and experimental knowledge of the piezoelectric ultrasonic amplifier, various applications are considered. Properties which are of importance for design of practical devices are discussed, and fundamental limitations are pointed out. Paramount among these are the high power consumption and low efficiency. Due to the inherent acoustic nature of the amplifier, ultrasonic devices such as active transducers and delay lines seem more promising than amplifiers for electric signals. A few unconventional designs are proposed. (Author)

AD-635 260 **Field 20A, 20F**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
BRILLOUIN SCATTERING IN LIQUIDS.
Master's thesis.
by Theodore Teruo Saito. Jun 66, 61p
Contracts DA-31-124-ARO (D)-425, SD-90

Descriptors: (*Sound, Scattering), (*Light, Scattering), (*Liquids, Acoustic properties), Lasers, Optical phenomena, Spectroscopy, Velocity, Attenuation, Water, Acetones, Toluenes, Carbon tetrachloride.

Identifiers: Brillouin scattering.

Light scattered from fluctuations caused by thermally excited sound waves, known as Brillouin scattered light, contains information about the velocity and lifetimes of the sound waves. A study was conducted using a frequency stabilized single mode helium-neon laser with .1 mw of output. Conical optics were used to gather the light. A detailed discussion of the conical optics is included, with attention given to the light gathering ability of the conical optics. Results of the measured velocity and lifetimes show no dispersion of the velocity or attenuation for acetone and water. The frequency dispersion of the velocity and the lifetimes for toluene are reported. It is believed that the light scattered from carbon tetrachloride contains a portion scattered from a second damped mode due to a thermal relaxation in the liquid. Until the spectrum of this light can be determined, accurate rements of the velocity and lifetimes in carbon tetrachloride cannot be made. (Author)

AD-635 471 **Field 20A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
SCHLIEREN STUDIES OF ULTRASONIC TRANSDUCERS.
Test rept.
by James R. Kymer. Jun 66, 9p
FA-T66-8-1

Descriptors: (*Transducers, Ultrasonic radiation), Schlieren photography, Sound transmission, Non-destructive testing, Structural shells.

Several ultrasonic transducers (used in the inspection of shell bodies) were examined by the Schlieren technique to determine the homogeneity of the radiated field. For 11 of the 15 transducers examined, the field was nonhomogeneous. (Author)

AD-634 783 **See Field 14B**

AD-634 904 **See Field 14B**

AD-635 186 **See Field 20N**

AD-635 488 **See Field 9D**

AD-635 530 **See Field 14B**

20B. CRYSTALLOGRAPHY

AD-634 923 **Field 20B**
CFSTI Prices: HC$2.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanics.
DYNAMICAL ASPECTS OF THE DEFORMATION OF A 6-CONSTANT CUBIC CRYSTAL,
by V. X. Kunukkasseril, and W. H. Hoppmann II. Jun 66, 42p

Contract DA-30-069-AMC-589 (R)
See also AD-629 734.

Descriptors: (*Crystal lattice defects, Dynamics), Equations of motion, Models (Simulations), Vibration, Elasticity.

The displacement equations of motion for a 6-constant centrosymmetric cubic crystalline material are developed. Also, the determinantal equations for velocities of plane elastic waves are developed. Previously determined elastic constants are used to calculate the phase velocities in various directions of a cubic crystal. Normal mode vibrations of cubes and infinite prisms are theoretically considered. Dilatational modes of these bodies are determined and they demonstrate that there are no couple-stress effects in these cases. Normal mode shapes and frequencies for the equivoluminal modes are obtained but without consideration of couple-stresses. Free vibration experiments were conducted on a two-dimensional model which was considered as a slice of an infinite prism and on a three-dimensional cubic model. Experimentally determined frequencies and mode shapes are studied in terms of the theoretical results. (Author)

AD-635 135 **Field 20B, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
OPTICAL AND ELECTRICAL PROPERTIES OF CRYSTALS.
Final scientific rept.
by Robert Englman. 30 Nov 65, 6p
Contract AF 61 (052)-806
AFCRL-66-387

Descriptors: (*Crystals, Physical properties), (*Crystal lattices, Spectroscopy), Electrical properties, Optical properties, Valence, Band spectrum, Selection rules, Operator (Mathematical), Symmetry (Crystallography), Israel.

A summary is given of studies involving covalency effects in trigonal distortion, the transition operator for spin-forbidden transitions and the intensity calculations for absorption bands in tetrahedral symmetry.

AD-635 407 **Field 20B**
CFSTI Prices: HC$4.00 MF$0.75
American Meteorological Society, Boston, Mass.
CRYSTAL LATTICE DEFECTS AND X-RAY SCATTERING.
Research translation.
by V. M. Danilenko, and L. V. Tikhonov. Apr 66, 106p T-R-547
Contract AF 19 (628)-3880
TT-66-61769
Defektii Kristallicheskoi Reshetki i Rasseianie Rentgenovskikh Luchei, trans. of Akademiya Nauk URSR, Kiev. Instytut Metallofizyky. Sbornik Nauchnykh Rabot, n15 79p 1962.

Descriptors: (*Crystal lattice defects, *X-ray diffraction analysis), Metallic crystals, X rays, Scattering, Crystal structure, Theory, USSR.

The paper attempts to classify a number of new results in the investigation of the microscopic structure of real crystals and also to illuminate certain problems related to the scattering of x-rays in crystals with defects. (Author)

AD-635 495 **Field 20B, 20L, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
ULTRAHIGH PRESSURE STUDIES AND CRYSTAL GROWTH TECHNIQUES: ANALYTICAL SURVEY.
Rept. no. 1 on ATD work assignment no. 79, task 25.
by John J. Kourilo. 17 May 66, 64p ATD-66-56
TT-66-61772
Bsed on Soviet-Satellite open sources pub. in 1963. Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Crystals, *High-pressure research), (*Crystal growth, Single crystals), USSR, Abstracts, Bibliographies, Films, Semiconductors, Epitaxial growth, Semiconducting films, Lasers, Piezoelectric crystals, Luminescence, Ferroelectric crystals, Ferromagnetic materials, Dielectrics, Inorganic compounds.

This report is divided into two main parts (analytical evaluation of data and annotated bibliography), each having three sections. The three sections are: general studies, ultrahigh pressure studies, and crystal growth techniques, in that order. Section 3 was further subdivided, for the purpose of retrieval, into six chapters according to the category of the growth technique. The chapters are: A. Growth from melts; B. Growth from solution (flux); C. Hydrothermal growth; D. Growth from vapor phase; E. Epitaxial growth of thin films; F. Other growth techniques. The report includes material dealing with ultrahigh pressure studies and techniques of single crystal growth (including deposition of single crystalline thin films) of the elemental semiconductors and semiconducting, lasing, luminescent, ferroelectric, ferromagnetic, piezoelectric, dielectric, and other inorganic compounds which may be of interest for aerospace technology.

ORNL-3949 **Field 20B, 11F**
CFSTI Prices: HC$3.00 MF$0.50
Oak Ridge National Lab., Tenn.
RADIATION METALLURGY SECTION, SOLID-STATE DIVISION PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 1966.
May 66, 49p
Contract W-7405-eng-26

Descriptors: (*Solid state physics, Radiation damage), (*Radiation damage, Metallography).

For abstract, see N 20 14.

AD-634 820 **See Field 20L**

AD-634 879 **See Field 20L**

AD-635 136 **See Field 9A**

AD-635 257 **See Field 5A**

20C. ELECTRICITY AND MAGNETISM

AD-635 060 **Field 20C, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
REMARKS ON THE EQUAL-TIME COMMUTATOR OF AXIAL-VECTOR CURRENT COMPONENTS.
by Klaus Dietz. 1966, 16p
Contract Nonr-1834 (05)

Descriptors: (*Field theory, *Pions), Nuclear energy levels, Nuclear forces, Nucleons, Vector analysis, Matrix algebra.

The matrix element of the equal-time commutator of the axial-vector current and its fourth component between one-nucleon states of the same momentum is investigated on the basis of very general principles. The dependence on the pion 4-momentum of Adler-Weisberger type relations for the renormalization of the axial-vector coupling constant is examined. Furthermore, the connection of Schwinger terms antisymmetric in the isospin indices with subtractions in the involved scattering amplitudes is shown. (Author)

AD-635 184 **Field 20C**
CFSTI Prices: HC$6.00 MF$0.75
Washington Univ., Seattle. Dept. of Electrical Engineering.
SECOND ORDER MOMENTS IN RADIATIVE SYSTEMS.
Technical rept.
by J. N. Lahti, and Akira Ishimaru. Mar 66, 63p TR-104
Contract AF 19 (628)-2763
Proj. AF-5635
Task 563502
AFCRL-66-248

Descriptors: (*Electromagnetic fields, *Moments), Mathematical models, Tensor analysis, Stochastic processes.

Identifiers: Coherence theory.

The radiative system (the source and its radiation field) is described as a continuous parameter stochastic process. A mathematical model is introduced which avoids a number of difficulties encountered in existing formulations of second order coherence theory. Equations obeyed by the coherence tensors in the radiation field are obtained in a simplified manner and general solutions to the tensor equations are found. Special cases and approximate forms (analogous to the Fresnel and Fraunhofer approximations) of the general solutions are presented. (Author)

AD-635 197 **Field 20C**
CFSTI Prices: HC$3.00 MF$0.50
Naval Ordnance Lab., Corona, Calif.
BIBLIOGRAPHY ON THE HALL EFFECT THEORY, DESIGN AND APPLICATIONS. SUPPLEMENT II.
by W. R. Turnbull. 1 Jun 66, 33p NOLC-659
Task RREN-04-012/211-1/F008-21-01

Descriptors: (*Hall effect, Bibliographies), Electronic equipment, Electrical engineering.

This supplement continues the international survey of unclassified scientific papers and reports on research and development of the Hall effect, and on electronic devices based on the Hall effect, to 1 April 1966. The basic document was NAVWEPS Report 7233 (AD-283 808); Supplement 1 was NAVWEPS Report 8168 (AD-420 105). (Author)

N66-16184 **Field 20C**
CFSTI Prices: HC$7.00 MF$2.00
National Academy of Sciences-National Research Council, Washington, D. C.
DIELECTRICS-DIGEST OF LITERATURE, VOLUME 28, 1964.
by H. E. Bussey. 14 Sep 64, 369p NAS-NRC-1342
Contract NsR-09-012-902
NASA-CR-69880

Descriptors: *Dipole moment, *Relaxation time, *Bibliography, *Dielectric material, *Insulating material.

For abstract, see T 66 16.

AD-462 001 **See Field 5A**

AD-634 789 **See Field 17E**

AD-635 193 **See Field 5A**

AD-635 313 **See Field 20L**

AD-635 534 **See Field 20N**

20D. FLUID MECHANICS

AD-461 260 **Field 20D, 14B**
CFSTI Price: HC$2.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DYNAMIC STABILITY CHARACTERISTICS OF A 10-DEG CONE AT MACH NUMBER 20.
by R. H. Urban, and R. J. Shanahan. Apr 65, 26p
AEDC-TR-65-80
N65-29196

Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Aerodynamics, Conical bodies), (*Conical bodies, Hypersonic characteristics), (*Hypersonic characteristics, Conical bodies), Hypersonic wind tunnels, Wind tunnel models, Model tests.

Tests were conducted in the 30-Inch Hypersonic Tunnel on the Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio to determine the effects of Reynolds number and frequency of oscillation on the damping-in-pitch derivatives of a 10-deg half-angle cone. Free oscillation data were obtained at a nominal Mach number of 20, at Reynolds numbers, based on model base diameter, from 50,000 to 100,000, and at model oscillation frequencies from 8 to 45 cps. Test results are presented, and comparisons are made with modified Newtonian impact theory and an unsteady flow field theory. (Author)

AD-634 781 **Field 20D, 20M, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Baltimore, Md. Dept. of Aeronautics.
HEAT LOSS OF HOT-WIRES IN SUPERSONIC FLOW.
by Leslie S. G. Kovasznay, and Sven I. A. Tormarck. Apr 50, 34p Bumblebee-127
Contract NOrd-8036

Descriptors: (*Supersonic flow, Heat transfer), (*Wires, *Heat transfer), (*Anemometers, Heat transfer), Reynolds number, Reduction, Shock waves, Tungsten, Turbulence, Sensitivity.

The purpose of the investigation was to determine the heat loss from hot-wires in supersonic flow in order to provide a basis for determination of the fluctuation sensitivity of the wires for turbulence measurements. The conclusion of the investigations on the fluctuation sensitivity is that the wire is sensitive to stagnation temperature fluctuations and mass flow fluctuations in varying degrees, depending on the wire operating temperature. This means that by varying the wire operating temperature the two kind of fluctuations can be separated. This fact gave impetus to the determination of nonlinear effects at high temperature loading. (Author)

AD-634 805 **Field 20D**
CFSTI Prices: HC$7.00 MF$1.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
AERODYNAMICS OF RAREFIED GASES (COLLECTION I).
21 Mar 66, 345p FTD-MT-64-293
TT-66-61579
Edited machine trans. of mono. Aerodinamika Razrezhennykh Gazov Sbornik I, Leningrad, 1963 268p.

Descriptors: (*Superaerodynamics, Theory), Integral equations, Kinetic theory, USSR.

This book is devoted to the basic questions of the aerodynamics of rarefied gases. It gives the derivation of the integral kinetic equations and formulates the problems of the aerodynamics of rarefied gases, certain methods of solving kinetic equations and their applications to a series of concrete problems are described, the probabilistic nature of the phenomena of collisions of particles among themselves and with the surfaces of immersed bodies are investigated. The collection is intended for engineers, scientists, post-graduate and student physicists, interested in the problems of the aerodynamics of rarefied gases. (Author)

AD-634 807 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
JOURNAL OF ENGINEERING PHYSICS (SELECTED ARTICLES).
12 Jan 66, 25p FTD-MT-65-185
TT-66-61581
Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) v7 n10 p14-20, 28-36 1964.

Descriptors: (*Axially symmetric flow, Gases), (*Flame propagation, Velocity), Methane, Physics, USSR, Turbulence, Laminar flow, Combustion, Air, Differential equations, Boundary layer.

Contents: Calculation of the main portion of an axially symmetric turbulent stream of a real gas, by V. I. Bakulev; Flame propagation in laminar and turbulent flows, by A. P. Kovalev, A. S. Ippolitov, Yu. M. Torgonenko, D. Bkhaduri, N. I. Chelnokov, and Yu. R. Shneyder.

AD-634 832 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
LAMINAR BOUNDARY LAYER ON A SUBLIMABLE SURFACE,
by B. V. Alekseev. 17 Jan 66, 19p FTD-MT-65-145
TT-66-61592
Edited machine trans. of Zhurnal Vychislitelnoi Matematiki i Matematicheskoi Fiziki (USSR) v4 n3 p512-24 1964.

Descriptors: (*Laminar boundary layer, Surfaces), Sublimation, USSR.

This work is dedicated to formulation and analysis of a chemically nonequilibrium boundary layer on a sublimable surface. There is performed comparison of results of analysis of a chemically nonequilibrium boundary layer with corresponding results obtained during use of concepts of frozen and equilibrium boundary layers. All calculations are conducted for the example of a body consisting of graphite. (Author)

AD-634 842 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Naval Ordnance Test Station, China Lake, Calif.
TURBULENT BOUNDARY-LAYER CALCULATIONS USING A LAW OF THE WALL - LAW OF THE WAKE METHOD,
by D. M. Nelson. Jun 66, 63p NOTS-TP-4083
Task RUTO-3E-000/216-1/R109-01-03

Descriptors: (*Turbulent boundary layer, Mathematical analysis), Wake, Pressure, Drag, Bodies of revolution.

Theoretical development of a law of the wall-law of the wake, incompressible, turbulent boundary-layer calculation method was published in AD-609 989. As a follow-on, the method is used here to obtain practical boundary-layer solutions, solving the equations on a high-speed computer and comparing the theoretical calculations with experimental data. It was necessary to make several modifications to the basic method, the most important being the inclusion of a way to give the boundary-layer solution a 'memory'. The calculation method appears able to yield satisfactory engineering answers for two-dimensional and axisymmetric boundary layers that develop in pressure distributions containing regions of adverse pressure gradient, favorable pressure, and zero or nearly zero pressure gradient. (Author)

AD-634 865 **Field 20D, 1A**
CFSTI Prices: HC$6.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
AERODYNAMIC CHARACTERISTICS OF WINGS AT SUPERSONIC SPEEDS,
by R. M. Snow, and E. A. Bonney. Mar 47, 67p Bumblebee-55
Contract NOrd-7386

Descriptors: (*Wings, *Aerodynamic characteristics), (*Supersonic flow, Wings), Airfoils, Delta wings, Supersonic flight.

Contents: Application of Busemann's Conical Field Method to Thin Wings, by Robert M. Snow; Aerodynamic Characteristics of Solid Rectangular Airfoils at Supersonic Speeds, by E. A. Bonney; The Reverse Delta Planform; Lift and Drag Characteristics of Delta Wings at Supersonic Speeds, by E. A. Bonney; and Sectional Characteristics of Standard Airfoils, by E. A. Bonney.

AD-634 868 **Field 20D, 16B**
CFSTI Prices: HC$6.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied physics Lab.
STUDIES IN SUPERSONIC AERODYNAMICS AS APPLIED TO CONTROLLED FLIGHT.
Doctoral thesis,
by Robert Peter Petersen. Oct 46, 62p Bumblebee-44

Descriptors: (*Aerodynamic characteristics, *Supersonic flight), Wing - body configurations, Free flight trajectories, Guided missile trajectories.

Measurements have been made on specially streamlined 5-inch rocket missiles in free flight at velocities from 1.85 to 0.9 times the velocity of sound. Ground observation techniques, for supersonic missiles including photo-triangulation, are discussed. Frequency deviation of a high frequency (60 megacycle) carrier has been used for telemetering pressures and accelerations in free flight. Drag measurements using sondes are found to be in good agreement with predictions of drag for simple bodies. The net drag coefficient, referred to a given body cross section area was 0.81 at Mach No. 1.6 for the streamlined missile. Measurements of base pressure check the von Karman-Moore values for base drag; the coefficient is about 0.20 at Mach No. 1.6. Pressure surveys on GU-2 aerofoils indicate fair agreement with linear flow theory and with the exact theory of Lighthill-Murnaghan at Mach numbers for which the latter theory is valid. These pressure measurements indicate the need for new theory in the transonic regime, Mach No. 1.5 to 1.0, for 10 per cent GU-2 aerofoils. A flip wing assembly using a delay squib has been built which introduces angles of incidence on two wings at pre-selected times of flight. This assembly, by causing angular acceleration, allowed determination of coefficients of lift for GU-2, i.e. double convex, aerofoils.

AD-634 870 **Field 20D**
CFSTI Prices: HC$7.60 MF$0.75
Michigan Univ., Ann Arbor. Office of Research Administration.
AN INVESTIGATION OF THE EXACT SOLUTIONS OF THE LINEARIZED EQUATIONS FOR THE FLOW PAST CONICAL BODIES.
by O. Laporte, and R. C. F. Bartels. Feb 48, 80p Bumblebee-75
Contract NOrd-7924
Proj. M604-3
Task UMH-3 (F)

Descriptors: (*Conical bodies, Aerodynamics), (*Wings, Aerodynamic characteristics), (*Supersonic flow, Conical bodies), Equations, Angle of attack, Functions.

Part I is devoted to the theory of conical flow and the formulation of an analytical treatment of the general problem. Parts II and III are devoted respectively to the determination of the conical flow past a plane arrow-shaped wing with angle of attack and zero yaw, and an elliptic cone with zero angle of attack by means of the method developed in the first part.

AD-634 872 **Field 20D, 16B, 1A**
CFSTI Prices: HC$15.50 MF$1.00
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PAPERS PRESENTED AT THE SYMPOSIUM ON CONTROL AND STABILITY AT SUPERSONIC SPEEDS HELD JUNE 19 AND 20, 1946.
20 Jun 46, 159p Bumblebee-60
Contract NOrd-8993

Descriptors: (*Symposia, *Supersonic flight), Control, Stability, Guided missile trajectories, Aircraft.

Contents: Aerodynamically Similar Models for Testing Jet-Propelled Missiles, by H. J. Stewart, California Institute of Technology; Supersonic Conical Flow Theory, by Leon Beskin, Consolidated Vultee Aircraft Corporation; Launching Problems of the RTV, by R. B. Hullett, Cornell Aeronautical Laboratory; Two-Dimensional Missile Trajectory, by G. C. Munro, Applied Physics Laboratory, The Johns Hopkins University; The Motion of Uncontrolled Nonspinning Missiles, by J. B. Rosser, Cornell University; Wind Tunnel and Flight Tests for Bumblebee, by A. R. Eaton, Applied Physics Laboratory, The Johns Hopkins University; Dynamic Stability at Supersonic Speed, by M. V. Barton, Defense Research Laboratory, University of Texas; The CTV Beam Rider, by D. T. Sigley, Applied Physics Laboratory, The Johns Hopkins University; Stability and Guidance, by E. L. Norton, Bell Telephone Laboratories; The Dynamic Response of a Missile to Specified Guidance Signals, by D. Young, Defense Research Laboratory, University of Texas; Control and Stability, by G. H. Stoner, Boeing Aircraft Company; Problems Involved in STV Flight Test Program, by A. Sowyrda, Cornell Aeronautical Laboratory; and List of Representatives Attending The Symposium On Control And Stability At Supersonic Speeds.

AD-634 952 **Field 20D**
CFSTI Prices: HC$4.00 MF$0.75
Sikorsky Aircraft Div., United Aircraft Corp., Stratford, Conn.
TABULATED SIKORSKY CH-34 BLADE SURFACE PRESSURES MEASURED AT THE NASA/AMES FULL SCALE WIND TUNNEL.
by J. P. Rabbott Jr, A. A. Lizak, and V. M. Paglino. 15 Jun 66, 113p SER-58399
Contract DA-44-177-AMC-53 (T)

Descriptors: (*Rotor blades (Rotary wings), Pressure), Model tests, Distribution, Aerodynamic characteristics, Tables, Wind tunnel models, Helicopters, Aerodynamic loading, Design.

Identifiers: H-34 aircraft.

Tests were conducted on a full scale Sikorsky CH-34 rotor blade system, instrumented to measure chordwise pressure distributions. The basic pressure measurements are presented in tabular form to make the detailed data available for possible analysis. (Author)

AD-634 988 **Field 20D, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Douglas Aircraft Co., Inc., Long Beach, Calif. Aircraft Div.
PROGRESS IN SOLVING THE FULL EQUATIONS OF MOTION OF A COMPRESSIBLE TURBULENT BOUNDARY LAYER.
by A. M. O. Smith, N. A. Jaffe, and R. C. Lind. 1966, 24p Douglas-Paper-3925
Presented at The BOWACA Symposium on Aeroballistics (7th), U. S. Naval Missile Center, Point Mugu, Calif., Jun 7-9, 1966.

Descriptors: (*Turbulent boundary layer, *Equations of motion), Compressible flow, Partial differential equations, Iterative methods.

For abstract, see T 66 16.

AD-635 010 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
AN EXPERIMENTAL INVESTIGATION OF TURBULENT, INCOMPRESSIBLE, THREE-DIMENSIONAL WALL JET.
Scientific rept.
by Herman Viets, and Pasquale M. Sforza. Apr 66, 44p PIBAL968
Contract AF 49 (638)-1623
Proj. AF-9781
Task 978101
AFOSR-66-0888

Descriptors: (*Jets, *Turbulence), Experimental data, Incompressible flow, Three-dimensional flow.

This paper presents an experimental investigation of the bulk properties of a turbulent, three-dimensional, incompressible air wall jet issuing into a quiescent air ambient from a rectangular orifice parallel to and at the surface of a flat plate. Results of this study indicate the characteristic features of such a dissipative flow. The behavior of a three-dimensional flow field of this nature has associated with it three distinct regions in the axis velocity decay with an approach to the flow field of a radial wall jet far downstream of the jet exit and on the centerline of the flow. Spreading rates in the various cross planes display a dependence upon the aforementioned characteristic regions. (Author)

AD-635 028 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Princeton Univ., N. J. Gas Dynamics Lab.
TURBULENT BOUNDARY LAYERS WITH ARBITRARY PRESSURE GRADIENTS AND DIVERGENT OR CONVERGENT CROSS FLOWS.
Technical rept.
by G. L. Mellor. Mar 66, 44p Rept. no. 775
Contract Nonr-1858 (38), Grant NSF-GS 579

Descriptors: (*Turbulent boundary layer, Dynamics), Pressure, Separation, Three-dimensional flow, Equations of motion.

A turbulent viscosity hypothesis which has been previously verified for 'equilibrium' boundary layers is now applied to incompressible boundary layers with arbitrary mainstream pressure variations. The empirical content of the turbulent viscosity hypothesis (which involves three adjustable constants, one of which is the von Karman constant) is solely derived from constant pressure profile data. The present work is an extension of the previous work in that the mean differential equations of motion are integrated numerically. This time, however, one must deal with partial differential equations instead of the similar, ordinary differential equations applicable to equilibrium flows. An important result is that prediction of the skin friction coefficient and separation is very good. Consideration of divergent or convergent cross flows (secondary flows) is included in the paper. (Author)

AD-635 090 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
David Taylor Model Basin, Washington, D. C.
A CAVITATION METHOD FOR THE DEVELOPMENT OF FORMS HAVING SPECIFIED CRITICAL CAVITATION NUMBERS.
Research and development rept.
by P. Eisenberg. Sep 47, 16p Rept. no. 647

Descriptors: (*Cavitation, Bubbles), (*Bubbles, Models (Simulations)), Hydrodynamic configurations, Bodies of revolution, Pressure, Mathematical analysis, Reynolds number, Photographic analysis.

From measurements of photographs of the bubbles, a model was constructed and the pressure distribution measured on the solid body of revolution obtained. The purpose of the report is to present the results of the correlation between cavitation bubble and solid model constructed to the shape of the bubble.

AD-635 151 **Field 20D**
CFSTI Prices: HC$6.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Hydrodynamics Lab.
THREE-DIMENSIONAL MOMENTUMLESS WAKES IN DENSITY-STRATIFIED LIQUIDS.
Final rept.
by Philip J. Stockhausen, Charles B. Clark, and John F. Kennedy. Jun 66, 109p T66-6, 93
Contract Nonr-1841 (59)
Proj. NR-062-228

Descriptors: (*Wake, Fluid dyanmic properties), Turbulence, Configuration, Surface properties, Density, Hydrodynamic configurations, Tanks (Containers), Water tunnels, Models (Simulations).

Identifiers: Stratified media.

Experiments were performed to investigate the configuration and surface effects of the turbulent wake generated by a self-propelled body moving in a linearly density-stratified liquid. The experiments were performed in a 50-foot long tank filled to a depth of 2 1/2 ft. For all experiments, the Reynolds number, based on the diameter of the circular disc mounted on the model's bow, was 89,000. It was found that the mixed region generated by the turbulent wake rapidly attained a maximum vertical extent, and then collapsed vertically while continuing to expand laterally. The vertical collapse of the wake was accompanied by the convergence toward the model of the fluid at the free surface. The convergence did not occur with homogeneous liquids. It was concluded that this surface convergence is possible only if the turbulent wake extends to the free surface. A new method was developed for generating linear density profiles in large tanks. (Author)

AD-635 239 **Field 20D**
CFSTI Prices: HC$1.50 MF$0.75
Oklahoma Univ., Norman.
SKIN FRACTION COEFFICIENTS OF COMPLIANT SURFACES IN TURBULENT FLOW.
Master's thesis.
by William Robert Looney. 1966, 74p
Contracts AF 33 (608)-1264, DA-31-124-ARO (D)-349

Descriptors: (*Skin friction, Reduction), (*Turbulence, Skin friction), Flexible structures, Surfaces, Viscosity, Airfoils.

From this experiment it may be concluded that flexible boundaries seem to substantially reduce skin friction in turbulent flow. Reductions of as much as 40-50% in skin friction were found in some experimental configurations. It is not possible to state that these lower values are a sole function of any one parameter such as viscosity, lateral tension, or longitudinal tension. The data indicates that the lowest skin friction depends upon the relation between these three variables as well as the mass or thickness of the flexible membrane. The skin friction of the flexible boundaries appear to decrease as the kinematic viscosity increases, at least up to 8000 CS, the highest value tested. In general, the reduction of skin friction is accompanied by a reduction in turbulence intensity. (Author)

AD-635 254 **Field 20D, 20I**
CFSTI Prices: HC$4.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
PARAMETRIC REPRESENTATIONS OF NON-STEADY ONE-DIMENSIONAL FLOWS.
by John H. Giese. Apr 66, 36p BRL-1316
Proj. RDT/E-1P014501A14B

Descriptors: (*One-dimensional flow, Mathematical analysis), Compressible flow, Magnetohydrodynamics, Explosions, Equations of state.

The determination of non-steady one-dimensional flows can be reduced to solving certain Monge-Ampere equations. Comparison of any two solutions of the same MA-equation shows that the map of one ut-plane onto the other preserves area. A classical parametric representation of all area-pre-

serving maps can be combined with a particular solution of an MA-equation to produce the general solution. Particular solutions can easily be constructed for perfect gases and for a vast number of more general equations of state. (Author)

AD-635 269 **Field 20D, 20K**
CFSTI Prices: HC$7.00 MF$1.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
JOURNAL OF APPLIED MECHANICS AND TECHNICAL PHYSICS (COLLECTION OF ARTICLES).
16 Feb 66, 345p FTD-MT-64-85
TT-66-61682
Edited machine trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n3 p1-168 1963.

Descriptors: (*Mechanics, Scientific research), (*Physics, Scientific research), USSR.

For abstract, see T 66 16.

AD-635 464 **Field 20D, 13J**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
PRESSURE DISTRIBUTION ON TOWED AND PROPELLED STREAMLINE BODIES OF REVOLUTION AT DEEP SUBMERGENCE.
Research and development rept.
by John L. Beveridge. Jun 66, 31p
Proj. S-R009-01-01
Task 0101
DTMB-1665

Descriptors: (*Bodies of revolution, Pressure), Deep submergence, Propellers (Marine), Towed bodies, Velocity, Boundary layer, Distribution, Underwater objects.

Measured and computed pressure distributions were obtained for a well-streamlined body of revolution (fineness ratio of ten to one), with and without a propeller, at deep submergence. Velocity distributions over the surface of the body with and without an added boundary-layer displacement-thickness are obtained from the velocity-potential function for a surface distribution of sources. Propeller-induced velocities in the near field ahead of a propeller are estimated from a uniform sink-disk representation and a single sink representation is used for large distances from the propeller. Propeller interference (Image effects are obtained from discrete singularities placed along the body axis. Within the field of propeller influence, differences occur in the theoretical and experimental pressure distributions. These discrepancies are discussed. (Author)

AD-635 524 **Field 20D, 12A**
CFSTI Prices: HC$4.00 MF$1.25
Pennsylvania State Univ., University Park. Dept. of Aeronautical Engineering.
NON-NEWTONIAN EFFECTS ON THE TURBULENT ENERGY SPECTRUM FUNCTION.
Doctoral thesis.
by Kirtan Singh. Mar 66, 200p Rept. no. 1
Contract Nonr-656 (33)

Descriptors: (*Turbulence, Energy), (*Fluid flow, Turbulence), Velocity, Integral equations, Elasticity, Incompressible flow, Drag.

Identifiers: Non-Newtonian fluids, Toms' effect.

Working with the isotropic homogeneous flow of second order fluids and assuming the turbulence Reynolds number to be very large, some features of the turbulent energy spectrum are investigated theoretically. Instead of working with the equation for the fluctuating energy of the turbulent flow, the fluctuating velocity is split into a macro component and a micro component associated respectively with eddies larger and smaller than a given size, and the energy equation for the micro component of velocity is derived. Terms representing interation between large and small eddies are then simplified by assuming that the departure from isotropy of the small eddies depends on the history of deformation of the large eddies. This equation is further simplified by assuming the existence of an equilibrium range. A change of variable converts this into an integral equation whose approximate solution is found by the method of iteration. The results present an extension of the energy spectrum form due to Heisenberg and mark three divisions of the whole range of wave numbers, which may be called the inelastic range, resonance range and elastic range. (Author)

AD-635 528 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Michigan Univ., Ann Arbor.
CAVITIES FORMED ON LIQUID SURFACES BY IMPINGING GASEOUS JETS.
Master's thesis.
by Frank Robert Cheslak. 1966, 94p

Descriptors: (*Cavitation, Liquids), (*Jets, Cavitation), Gases, Surfaces, Nozzles, Jet mixing flow, Axially symmetric flow, Two-dimensional flow.

Identifiers: Jet impingement.

Assuming the jet mixes turbulently with the surrounding atmosphere, the stagnation pressure corresponding to the centerline conditions of the jet at a point of the cavity's maximum depth, i.e., height of mozzle above liquid plus cavity depth, was equated with the hydrostatic pressure at the cavity's bottom allowing a determination of the depth. The diameter of the cavity or maximum width was predicted for axisymmetric and two-dimensional jets. Prediction of minimum jet pressure required to induce liquid spray was made by an equilibration of surface tension, gravity, and drag forces. Experimental tests of air impinging on both water and wet cement were performed and analyzed along with the results of air impingement on various other liquids. The experimental cavities formed on the water were extremely irregular, however, time exposure photographs allowed detailed inspection of the steady state shape of these cavities. Cavities were also formed on wet cement and by allowing the cement to set with the air jet still impinging, detailed measurements could be made of the solidified cavity shape. Streamline tests were then made within and above some of these cavities. (Author)

N66-16181 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Avco-Everett Research Lab., Everett, Mass.
EXPERIMENTAL INVESTIGATION OF ADVANCED SUPERCONDUCTING MAGNETS.
Annual rept.
by E. D. Hoag. Jul 65, 69p
NAS8-5279
NASA-CR-69883

Descriptors: *Magnet, *Niobium compound, *Zirconium-niobium alloy, *Semiconductor.

For abstract, see T 66 16.

N66-16587 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Southwest Research Inst., San Antonio, Tex.
MOMENT OF INERTIA AND DAMPING OF LIQUIDS IN BAFFLED CYLINDRICAL TANKS.
by F. T. Dodge, and D. D. Kana. Feb 66, 29p
Contract NAS8-1555
NASA-CR-383

Descriptors: *Cylindrical tank, *Fluid mechanics, *Damping, *Inertia moment, *Liquid sloshing.

AD-634 806 **See Field 20M**

AD-635 154 **See Field 12A**

AD-635 156 **See Field 14B**

AD-635 195 **See Field 17G**

AD-635 230 **See Field 21E**

AD-635 231 **See Field 20M**

AD-635 255 **See Field 21E**

20E. MASERS AND LASERS

AD-415 282 **Field 20E, 20L**
CFSTI Price: HC$1.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
THE ABSORPTION AND EMISSION SPECTRUM OF CaF2:U (+++),
by Robert E. Meredith, and Joe A. Jenney. Aug 63, 16p Rept. no. 2900-438-R
Contract DA-36-039-sc-78801
Proj. DA-3D5801001
Memo. of Proj. Michigan.

Descriptors: (*Lasers, Materials), (*Uranium, Spectroscopy), (*Calcium compounds, Fluorides), Crystal lattices, Emissivity, Absorption spectrum, Continuous spectrum, Line spectrum, Magnetic fields.

Identifiers: Calciuflouride, Zeeman effect.

The emission and absorption of CaF2:U (+++) were scanned at 77K and 4.2K, and line widths were measured. The spectrum is interpreted as arising from ions perturbed by a weak tetragonal crystal field. Preliminary results of the Zeeman effect on the narrowest lines are presented. (Author)

AD-634 849 **Field 20E**
CFSTI Prices: HC$2.00 MF$0.50
Hughes Aircraft Co., Culver City, Calif. Research and Development Div.
DYNAMIC OPTICAL PROPERTIES OF LASER MATERIALS.
Final technical summary rept.,
by J. W. Carson, and L. G. Komai. 31 May 66, 42p P66-134
Contracts Norn-4878 (00), ARPA Order-306

Descriptors: (*Lasers, Ruby), (*Ruby, Optical properties), Distortion, Pumping (Optical), Gain, Refraction, Temperature, Rods, Neodynium, Glass.

Dynamic optical distortions were studied in high quality ruby rods (0.05 percent Cr2O3). Radial temperature profiles, determined by non-resonant interferometric techniques, were level to about 5 percent. Radial gain profiles showed variations of 5 percent to 20 percent, depending on the pump energy. A plane polariscope was used to determine the effects of stress birefringence during the pump period. No significant depolarization was observed in ruby during the main part of the pump period, but large birefringence effects were seen in Nd:glass. Thermal changes in length and refractive index were found to be the main source of dynamic optical distortions in ruby. The net effect of these distortions can be made small by use of properly designed cavities. (Author)

AD-634 913 **Field 20E**
CFSTI Prices: HC$2.00 MF$0.50
Florence Univ. (Italy). Istituto di Onde Elettromagnetiche.
A GENERALIZATION OF TANG, STATZ AND deMARS THEORY OF MULTIMODE OSCILLATIONS IN A SOLID-STATE LASER.
Interim rept.
by L. Ronchi. Feb 66, 32p Scientific-2
Contract AF 61 (052)-871
AFCRL-66-384

Descriptors: (*Lasers, Oscillation), Theory, Cavity resonators, Mirrors, Solids, Optical

properties, Pumping (Optical), Reflection, Frequency, Atomic energy levels, Italy.

The Tang, Statz and deMars theory of multimode oscillations of a solid-state laser, under stationary conditions, is extended to treat the cases of cavities with lossy end mirrors or with frequency-dependent losses. (Author)

AD-635 016 **Field 20E**
CFSTI Prices: HC$2.00 MF$0.50
Advanced Kinetics, Inc., Costa Mesa, Calif.
STUDIES ON THE INTERACTION OF LIGHT AND PARTICLE BEAMS.
15 Mar 66, 37p
Contract AF 49 (638)-1359
AFOSR-66-1090

Descriptors: (*Lasers, *Magneto-optic effect), (*Partical beams, Lasers), Magnetic fields, Hysteresis, Aluminum, Particles, Evaporation.

The large values of Faraday rotation obtained in optical media with the use of pulsed high magnetic fields have found a practical application in the control of laser cavities. Experiments were conducted in which high magnetic fields up to 400 k Oe were used to introduce large rotations of the plane of polarization in short, highly transparent samples. The operation with the ruby laser resulted in a periodic equispaced output which could be related to the risetime of the magnetic fields (on the order of 20 k Oe/usec). In a further series of experiments a synchronized cryptocyanine shutter was operated yielding either a single giant pulse or a well-spaced series of pulses. In this mode of operation the output pulse could be synchronized to the varying magnetic field with an accuracy of a fraction of a microsecond. The studies on the interaction between a coherent light beam and macroscopic particles were continued. The effect of localized evaporation induced in minute particles by an impinging beam of coherent radiation was calculated. The expected recoil velocities as generated by the beam pressure compounded by the evaporation process were determined and the acceleration of the macroscopic particles was evaluated for a given duration of the vaporization process.

AD-635 065 **Field 20E, 20F**
CFSTI Prices: HC$3.00 MF$0.50
Springfield Armory, Mass.
DOUBLE PULSE PUMPING OF RUBY LASERS.
Technical rept.
by Peter Shajenko. 8 Apr 66, 58p SA-TR20-9301
Proj. DA-1P0114501A31C

Descriptors: (*Lasers, *Pumping (Optical)), Ruby, Excitation, Light pulses, Xenon lamps, Flash lamps, Electric discharges, Impedance matching, Quantum mechanics.

Laser performance in double pulse mode of pumping was studied. The xenon flash lamp was energized by two condenser banks discharged in sequence with a time delay between both discharges. Theoretical analysis of discharge characteristics and of experimental data including discharge current, pumping light and laser output at threshold, and higher energy levels in relation to varying time delay are presented. Improvements in overall laser efficiency as much as 12 per cent in double pulse pumping were obtained as compared with conventional single pulse pumping in the experimental setup. The possibility of adjusting the dynamic impedance of the light source and of modifying pumping light pulse for improvement of laser performance is cited. (Author)

AD-635 399 **Field 20E, 20F**
CFSTI Prices: HC$2.00 MF$0.50
Electronic Defense Labs., Sylvania Electronic Systems-West, Mountain View, Calif.
TECHNIQUES FOR SUPER-MODE OSCILLATION.
Interim engineering rept. no. 4, 1 Mar-31 May 66.
by Russell Targ. 31 May 66, 34p
Contract AF 33 (615)-2884
See also AD-633 014.

Descriptors: (*Lasers, Frequency modulation), Optics, Monochromatic light, Mirrors, Servomechanisms, Phase-locked systems, Electrooptics.

Identifiers: Super-mode oscillation.

By means of a frequency selective coupler, more than 50 percent of the multimode power of a He-Ne laser was obtained at a single frequency. The amplitude stability of this single-frequency output was strongly dependent on the behavior of the power stabilization system used to control the positions of the laser mirrors. 28 mw of single-frequency light was obtained from a 50 mw He-Ne laser using the stabilization system described in the previous report. One of the limitations on the use of the super-mode technique is the very high peak-phase deviation ratio (T) that results from the operation of high-power FM lasers. Recently we have been able to operate an FM He-Ne laser with an internal phase perturbation driven at twice the axial mode interval of the laser cavity. The result of this 2 (c/2L) excitation is an FM laser with approximately half the usual number of driven modes and thus half the modulation index to be un-modulated by the super-mode modulator. The preliminary design for the control system to absolutely stabilize the frequency of the FM laser has been completed.

AD-634 886 **See Field 17I**

AD-634 917 **See Field 19E**

AD-635 257 **See Field 5A**

AD-635 287 **See Field 9A**

AD-635 301 **See Field 4A**

BNWL-241 **See Field 8K**

20F. OPTICS

AD-634 811 **Field 20F, 7D, 20J**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ON THE THEORY OF RAMAN SCATTERING OF LIGHT BY A MOLECULE,
by K. Rebane, and T. Rebane. 18 Feb 66, 18p
FTD-MT-65-225
TT-66-61585
Edited machine trans. of Akademiya Nauk Estonskoi SSR, Tallinn. Izvestiya. Seriya Fiziko-Matematicheskikh i Teknicheskikh Nauk, v12 n3 p227-37 1963.

Descriptors: (*Light, Scattering), (*Raman spectroscopy, *Molecular properties), Oscillation, Harmonic generators, Quantum mechanics, Molecular energy levels, Perturbation theory, Green's function, Wave functions, Crystal lattices, Impurities, USSR.

Identifiers: Raman scattering.

The intensity of the Raman scattering by molecular oscillations is calculated on the basis of the adiabatic approximation. The oscillations are described in terms of harmonic oscillators whose equilibrium positions are displaced with the change of the electronic state of the molecule, but whose frequencies remain unchanged. For the solution of the corresponding quantum mechanical second order perturbation theory problem a new method is applied, permitting to sum up all intermediary states. Also some general problems connected with the second order perturbation theory are discussed, as the relation of such problems with Green's functions, and Green's function for the harmonic oscillator's stationary Schrodinger equation is obtained. Lastly, some sum rules for the second order perturbation theory matrix elements are derived. (Author)

AD-635 015 **Field 20F, 9D, 17H**
CFSTI Prices: HC$2.00 MF$0.50
Idealab, Inc., Franklin, Mass.
EXPERIMENTS IN SPATIAL FREQUENCY HETERODYNING.
Final rept.
by James L. Pritchard. 15 Aug 65, 36p
Contract AF 19 (628)-3831, ARPA Order-450

Descriptors: (*Optics, *Information theory), (*Mixers (Electronic), Optical equipment components), Diffraction gratings, Band-pass filters, Lenses, Optical tracking.

Identifiers: Spatial frequency heterodyning.

The object of the experiments was to demonstrate the feasibility of using heterodyning techniques to extract information from an object whose spatial frequencies were outside the bandpass of a lens system. The lens system that was used was approximately an F3 system. Such a system has a pass band of from 0 lines per mm to approximately 526.75 lines per mm at lambda = 0.6328 x 0.001 mm assuming the system to be diffraction limited only. This figure of 526.75 lines/mm appeared to be a substantially accurate figure as it was just able to pass part of the first order of a 7500 lines per inch grating. The first order spatial frequency of such a grating when illuminated by a wave length of light, lambda = 0.6328 x 0.001 mm, is equal to 590 lines per mm.

AD-635 044 **Field 20F, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
THERMOLUMINESCENCE OF SEMICONDUCTING DIAMONDS,
by A. Halperin, and R. Chen. Jan 66, 26p
Scientific-5
Contract AF 61 (052)-759
AFCRL-66-385

Descriptors: (*Luminescence, *Diamonds), Semiconductors, Heating, Excitation, Optical phenomena.

Identifiers: Thermoluminescence.

The thermoluminescence (TL) of semiconducting diamonds was found to be composed of blue-emitting (at 150 and 260K) and red-emitting peaks (at 175 and 285K). The red peaks could be excited by light of wavelengths up to about650 millimicrons (1.8 ev), the blue ones by light up to about 420 millimicrons (3 ev). The intensity of the red peaks and of the 150K blue peak was found to increase linearly with the dose of excitation. The same was found for the 260K blue peak on excitation at the absorption edge (225 millimicrons 5.5 ev). Excitation of this peak at 260-400 millimicrons was found to be superlinear; the peak increased under suitable conditions with the third power of the dose of excitation. Other measurements included the thermal activation energies, the optical bleaching of the glow peaks, and the decay of phosphorescence after excitation at 77K. A tentative model for the energy levels involved in the processes of excitation and emission of the TL is presented to account for the observations. A multiple-stage excitation is proposed to explain the superlinearity. (Author)

LA-3475 **Field 20F**
CFSTI Prices: HC$5.00 MF$1.00
Los Alamos Scientific Lab., Univ. of California, N. Mex.
PRESENT STATUS OF THE ANALYSIS OF THE ARC SPECTRUM OF URANIUM (UI).
by David W. Steinhaus, Jean Blaise, and Michele Diringer. Jan 66, 184p
Contract W-7405-eng-36

Descriptors: (*Radioactive isotopes, Uranium), (*Line spectrum, Uranium).

For abstract, see N 20 14.

N66-16555 Field 20F
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
OPTICAL ABSORPTION COEFFICIENTS OF FUSED SILICA IN THE WAVELENGTH RANGE 0.17 TO 3.5 MICRONS FROM ROOM TEMPERATURE TO 980 DEG C.
by O. J. Edwards. Feb 66, ∠5p NASA-TN-D-3257

Descriptors: *Optical absorption, *Silicon oxide, *Spectrophotometry, *Absorption coefficient.

AD-462 001 See Field 5A

AD-634 820 See Field 20L

AD-634 990 See Field 3C

AD-635 049 See Field 12A

AD-635 065 See Field 20E

AD-635 220 See Field 4A

AD-635 237 See Field 4B

AD-635 260 See Field 20A

AD-635 266 See Field 4A

AD-635 301 See Field 4A

AD-635 376 See Field 4A

AD-635 399 See Field 20E

20G. PARTICLE ACCELERATORS

AD-473 825 Field 20G
CFSTI Prices: HC$2.60 MF$0.50
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
THE US ARMY NUCLEAR DEFENSE LABORATORY'S POSITIVE ION ACCELERATOR.
Rept. for Jan-Jun 65,
by John C. Goshorn Jr. Oct 65, 27p NDL-TM-22
Proj. 1A022601A089-03

Descriptors: (*Ion accelerators, Design), Ion beams, Power supplies, Ion sources, Focusing, Spectrum analyzers, Vacuum apparatus, Particle accelerator targets, Radiation measurement systems, Control systems, Shielding, Operation.

The Cockcroft-Walton Positive Ion Accelerator, installed at US Army Nuclear Defense Laboratory, Edgewood Arsenal, Maryland, has a maximum energy of 650 keV, is capable of producing a direct current beam of approximately 1-mA of low-Z nuclei, or of producing beam pulses 2 to 15 ns wide and 2 mA in amplitude. The report describes the accelerator, the accelerator's enclosure, and some of the accelerator's capabilities. (Author)

AD-634 814 Field 20G
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ION SOURCE WITH LONGITUDINAL MAGNETIC FIELD,
by S. V. Starodubtsev, and V. A. Muminov. 20 Jan 66, 8p FTD-TT-65-1474
TT-66-61588
Unedited rough draft trans. of Akademiya Nauk Uzbekskoi SSR, Tashkent. Izvestiya. Seriya Fiziko-Matematicheskikh Nauk n1 p57-9 1965.

Descriptors: (*Ion sources, Magnetic fields), Gas discharges, Gas ionization, Hydrogen, Discharge tubes, Ionic current, Vacuum, Cathodes, USSR.

A source of hydrogen ions is described which features a low pressure glow discharge with a magnetic field directed along the discharge axis.

N66-15830 Field 20G
CFSTI Prices: HC$4.00 MF$1.25
Electro-Optical Systems, Inc., Pasadena, Calif.
HALL CURRENT ACCELERATOR.
Final rept. 10 Jun 64-10 Sep 65.
by G. L. Cann, R. L. Harder, P. D. Lenn, and R. A. Moore. 4 Feb 66, 158p EOS-5470-Final
Contract NAS3-5909
NASA-CR-54705

Descriptors: *Propulsion system, *Spacecraft propulsion, *Axisymmetry, *Electric propulsion, *Hall accelerator.

For abstract, see T 66 16.

N66-16285 Field 20G
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
BASIC STUDIES OF A LOW DENSITY HALL CURRENT ION ACCELERATOR.
by D. L. Chubb, and G. R. Seikel. Feb 66, 57p NASA-TN-D-3250

Descriptors: *Plasma potential, *Electron temperature, *Hall accelerator, *Ion current.

SLAC-59 Field 20G, 20H
CFSTI Prices: HC$3.00 MF$0.75
Stanford Linear Accelerator Center, Stanford Univ., Calif.
TWO-MILE ACCELERATOR PROJECT.
Quarterly status rept., 1 Oct-31 Dec 65.
Mar 66, 97p
Contract AT (04-3)-400

Descriptors: (*Systems engineering, Linear accelerators), (*Particle accelerators, Systems engineering).

For abstract, see N 20 14.

CEX-65.01 See Field 6R

20H. PARTICLE PHYSICS

AD-634 869 Field 20H
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Los Angeles. Dept. of Physics.
ENERGY AND ANGULAR CORRELATIONS IN THE C-12 (p,2p)B-11 REACTION AT 45.5 MEV.
Technical rept.
by Kenneth E. Richie. May 66, 99p TR-P-75
Contract Nonr-233 (44)

Descriptors: (*Carbon, Proton bombardment), (*Proton reactions, Nuclear spectroscopy), Boron, Energy, Cyclotrons, Proton beams, Nuclear models, Nuclear cross sections.

The angular correlation of the two protons emitted from the C12 (p,2p)B11 reaction at 45.5 MeV was measured with one detector fixed at 30 degrees and the other rotated from 20 degrees to 140 degrees, in steps of 10 degrees, on the opposite side of the beam line. The energy sharing of the two protons was also determined, using two dimensional analysis by an on-line computer system. The results were fit with a computer program based on the distorted wave theory. (Author)

AD-634 919 Field 20H
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
ENERGY AND ANGULAR DISTRIBUTION OF GAMMA RAYS SCATTERED IN ALUMINUM,
by John G. Dardis, and Norman E. Scofield. 11 Jul 66, 40p USNRDL-TR-1018
Proj. SF-011-05-11
Task 0501

Descriptors: (*Gamma-ray scattering, *Aluminum), Cesium, Radioactive isotopes, Spectroscopy, Gamma-ray spectra, Distribution, Energy.

The energy and angular distribution of plane perpendicular Cs137 gamma rays scattered in 1 through 5 mean free paths of aluminum was measured using a NaI (T1) spectrometer. The results are compared with distributions calculated from the method of moments and polynominal expansion. For 1 and 2 mean free paths the infinite-medium calculations for multiple scatter are considerably in excess of the experimental results at the distribution peak; otherwise, the spectrum shape is reproduced satisfactorily. For 3, 4, and 5 mean free paths the calculations are in good agreement with experiment. (Author)

AD-635 017 Field 20H
CFSTI Prices: HC$4.00 MF$0.75
Office of Research Administration, Univ. of Michigan, Ann Arbor.
THE POLARIZATION PARAMETER IN ELASTIC PROTON-PROTON SCATTERING FROM .75 TO 2.84 GeV.
Technical rept.
by Homer A. Neal Jr. Apr 66, 114p TR-23, 03106-23-T
Contract Nonr-1224 (23)
Proj. NR-022-274

Descriptors: (*Proton scattering, Polarization), (*Nuclear spins, Polarization), Proton reactions, Elastic scattering, Measurement, Particle accelerator targets, Liquefied gases, Helium, Carbon, Antiparticles, Proton cross sections.

Identifiers: Regge poles.

A double-scattering technique was employed to measure the polarization parameter in elastic proton-proton scattering at .75, 1.03, 1.32, 1.63, 2.24, and 2.84 GeV. An external proton beam from the Brookhaven Cosmotron was focussed on a three inch long liquid hydrogen target and the elastic recoil and scattered protons were detected in coincidence by scintillation counters. The polarization produced in the scattering process was inferred from the azimuthal asymmetry exhibited in the scattering of the recoil beam from a carbon target. This asymmetry was measured by a set of two scintillation counter telescopes which symmetrically viewed the carbon target. The analyzing power of this arrangement was previously determined in an independent experiment employing a 40% polarized proton beam. The corrected values of the polarization parameter are exhibited as a function of the center-of-mass scattering angle for each incident beam energy. The prediction of the Regge theory that the polarization parameter in elastic proton-proton scattering is related to the total proton-proton and proton-antiproton cross sections was found to be consistent with the experimental results. (Author)

AD-635 023 Field 20H
CFSTI Prices: HC$2.00 MF$0.50
Illinlis Univ., Urbana.
THE ABSORPTIVE PERIPHERAL MODEL.
by J. D. Jackson. 1966, 27p
Contract Nonr-1834 (05)
Presented at the Conference on High Energy Two-Body Reactions held at the State University of New York, Stoney Brook, Apr 22-23 1966.

Descriptors: (*Nuclear models, *Nuclear reactions), Pair production, Absorption, Momentum, Mesons.

For abstract, see T 66 16.

AD-635 061 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Cosmic Ray Group.
DIRECT SEARCH FOR THE C-VIOLATING DECAY 'NEUTRAL-ETA TO NEUTRAL-PION + POSITRON + ELECTRON.'
Technical rept.
by H. H. Bingham, W. Michael, C. Baglin, A. Bezaguet, and B. Degrange. Jun 66, 19p ONR-1-1966
Contract Nonr-3656 (13)
Proj. NR-021-007

Descriptors: (*Baryons, Nuclear reactions), (*Nuclear reactions, Detection), Pions, Positrons, Electrons, Decay schemes, Meson bombardment, Bubble chambers, Quantum mechanics, Groups (Mathematics), Gamma rays, Proton reactions.

Identifiers: CP invariance, Eta baryons.

No examples of the decay 'neutral-eta to neutral-pion + positron + electron' were found in a sample of film containing 387 detected 'neutral-eta to neutral-pion + positive-pion + negative-pion. The film was taken with the Ecole Polytechnique heavy liquid bubble chamber exposed to 950 MeV/c negative-pions at Saclay. With 90% confidence the branching ratio to 'neutral-eta to neutral-pion + positron + electron is less than 0.23% of all neutral-eta baryons decays. (Author)

AD-635 312 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Alabama Univ., University.
SINGLE LEVEL MUON CAPTURE CALCULATIONS FOR C12 AND O16.
Interim rept.
by J. N. Huffaker, and R. F. Jacob. May 66, 86p
Grant DA-ARO (D)-31-124-G664
Projs. DA-20014501B11B, ARO (D)-4819-P
AROD-4819:1

Descriptors: (*Meson capture, Wave functions), (*Muons, Meson capture), (*Carbon, Meson capture), (*Oxygen, Meson capture), Fermions, Leptons, Nuclear energy levels, Transformations, Probability, Tensor analysis.

Assuming the validity of the Universal Fermi Interaction hypothesis, comparison of theoretical single level muon capture rates with experimental data may prove valuable in determining the form and extent of renormalization of the nucleon-lepton weak interaction Hamiltonian density (the magnitudes of the induced form factors). To this end the muon capture transition probabilities were calculated for the C12 to B12 (ground state to ground state) and the O16 to N16 (O (+) to O (-)), (O (+) to 1 (-)) transitions. Analysis of experimental results for these rates permits the computation of a region of possible values for the induced pseudoscalar (g sub p) and induced tensor (g sub T) form factors. The results are qualitatively in agreement with theoretical predictions of g sub p = 8 (lambda), where g sub T = O. The muon wave functions are corrected for finite nuclear size and relativistic effects, which are found to be not entirely negligible, even for the ratio of O16 capture rates. (Author)

AD-635 483 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
INTERPRETATION OF THE N_ EFFECT IN DEUTERON COMPTON SCATTERING.
by Melvin Month. 1966, 21p
Contract Nonr-1834 (05)

Descriptors: (*Deuterons, *Compton Scattering), Nucleons, Nuclear Energy Levels, Nuclear Scattering, Nuclear resonance, Differential cross section, Pions.

Calculations of deuteron Compton scattering based on impulse methods demonstrate a peaking of the energy distributions due to the N* pole in the factored nucleon amplitude. It is suggested that the factorization procedure is questionable when a pole exists in the factored amplitude, as is evidenced, for example, by the failure of the impulse technique near threshold where the nucleon pole term is of importance. This difficulty is obviated by correctly treating the N* as an intermediate state. An expression for the deuteron Compton differential cross section was derived. To avoid ambiguities inherent in the spin case, scalar particles were used. A comparison with the limited experimental data available above the photopion threshold produced very encouraging results. (Author)

ANL-7133 **Field 20H, 18K**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
CALCULATIONS OF ZPR-3 FAST ASSEMBLIES USING A 26-GROUP ARGONNE CROSS-SECTION SET.
by D. Meneghetti, and J. R. White. Jan 66, 16p
Contract W-31-109-eng-38

Descriptors: (*Prompt neutrons, Reactor cores), (*Critical assemblies, Neutron flux).

For abstract, see N 20 14.

BNL-946 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
NEUTRONS AS MAGNETIC PROBES.
by Robert Nathans. 29 Sep 65, 18p Brookhaven lecture series-49
Contract AT (30-2)-GEN-16

Descriptors: (*Probes (Electromagnetic), Neutrons), (*Neutron beams, Neutron scattering).

For abstract, see N 20 14.

IDO-17173 **Field 20H, 18K**
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
TECHNIQUES FOR DETERMINING ETA FOR THE THERMALLY FISSIONABLE ISOTOPES.
by J. Richard Smith, and Edwin Fast. Apr 66, 25p

Contract AT (10-1)-205

Descriptors: (*Fission neutrons, Reactor lattice parameters), (*Thermal neutrons, Reactor theory).

For abstract, see N 20 14.

N66-15324 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Enrico Fermi Inst. for Nuclear Studies, Chicago Univ., Ill.
A MULTI-CHANNEL DIGITAL PROGRAM GENERATOR FOR SIMULATING CHARGED PARTICLE PENETRATION OF COUNTER TELESCOPES.
by R. Weissman. Sep 64, 31p EFINS-64-49-Rev
Grant NsG-179-61
NASA-CR-57140

Descriptors: *Penetration, *Charged particle, *Infrared detector, *Simulation, *Solid state device, *Stimulation.

N66-15345 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
INCREASED BRIGHTNESS OF THE LUNAR SURFACE.
by J. Koo, and A. Palm. 15 Jun 65, 37p Rept. no. 6-Issue-35
Grant NsG-243-62
NASA-CR-69289

Descriptors: *Brightness, *Electron radiation, *Lunar surface, *Proton irradiation, *Solar flare.

N66-15352 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.50
State Univ. of Iowa, Iowa City. Dept of Physics and Astronomy.
IMPULSIVE EMISSION OF APPROXIMATELY 40 KE V ELECTRONS FROM THE SUN.
by S. M. Krimigis, and J. A. Van Allen. Jun 65, 51p Rept. no. 65-28
Grant NsG-233
NASA-CR-69350

Descriptors: *Mariner IV space probe, *Solar flare, *Electron emission, *High energy electron, *Particle detector.

N66-15379 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
THE EFFECT OF ADIABATIC DECELERATION ON THE COSMIC RAY SPECTRUM IN THE SOLAR SYSTEM.
by E. N. Parker. 1965, 30p EFINS-65-92
Grant NsG-96-60
NASA-CR-69344

Descriptors: *Cosmic ray, *Particle motion, *Solar wind, *Deceleration.

N66-15817 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
SOLID-STATE DETECTOR.
by D. O. Hansen. Aug 65, 9p STL-4158-6018-TU-000
Contract NASw-936
NASA-CR-695761

Descriptors: *Junction diode, *Particle detector, *Silicon radiation detector, *Solid State device, *Barrier layer.

N66-16382 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
A CORRELATION OF OUTER RADIATION ZONE ELECTRONS (EE APPROXIMATELY 1 ME V) WITH THE SOLAR ACTIVITY CYCLE.
by L. A. Frank, and J. A. Van Allen. Jan 66, 17p Rept. no. 66-1
Contract Nonr-1509 (06), Grant NsG-233-62
NASA-CR-69873

Descriptors: *Electron intensity, *Radiation belt, *Solar flare, *Solar activity effect.

N66-16935 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SOLAR CYCLE EFFECTS ON INNER ZONE PROTONS.
by R. C. Blanchard, and W. N. Hess. Feb 66, 43p
NASA-TN-D-3086

Descriptors: *Energy spectrum, *Flux density, *Inner radiation belt, *Proton energy, *Solar cycle.

ORNL-3934 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
ELASTIC AND INELASTIC SCATTERING OF 12.7-MEV PROTONS FROM 90 ZR, 92 ZR, AND 94 ZR TABULATED DIFFERENTIAL CROSS SECTIONS.
by J. K. Dickens, E. Eichler, and R. J. Silva. May 66, 37p
Contract W-7405-eng-26

Descriptors: (*Protons, Elastic scattering), (*Inelastic scattering, Protons).

For abstract, see N 20 14.

AD-635 060 See Field 20C

AD-635 252 See Field 18H

AD-635 253 See Field 20J

AD-635 306 See Field 20L

AD-635 525 See Field 3B

IDO-17174 See Field 18C

LA-3439 See Field 18C

NLCO-973 See Field 7E

PB-170 543 See Field 18J

SLAC-59 See Field 20G

20I. PLASMA PHYSICS

AD-427 062 **Field 20I, 17I, 20N**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
THE SCATTERING OF ELECTROMAGNETIC WAVES FROM PLASMA CYLINDERS: PART I,
by Phyllis Greifinger. Aug 63, 42p RM-3573-ARPA-Pt-1

Descriptors: (*Radar signals, Scattering), (*Plasma medium, Scattering), (*Electromagnetic waves, Scattering), Radar echo areas, Theory, Electron density, Backscattering.

The memorandum reviews the theory of the scattering of electromagnetic radiation in the transverse magnetic mode by infinite plasma cylinders with radially varying electron-density distributions. Techniques for calculating the scattering cross section are described, with special emphasis placed on short wavelength scattering. Specific calculations of the back-scattering (radar) cross section are made in the geometrical-optics limit and in the Born-approximation limit for several monotonically decreasing electron-density distributions which have zero slope on the cylinder axis. The radar cross section in the region of transition from underdense to overdense plasma is programmed and computed on the IBM 7090 for a Gaussian and for a quadratic electron distribution for wavelengths equal to 1/10 and 1/100 of the cylinder radius. (Author)

AD-444 792 **Field 20I, 17I, 20N**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
THE SCATTERING OF ELECTROMAGNETIC WAVES FROM PLASMA CYLINDERS: PART II,
by Phyllis Greifinger. Jul 64, 49p RM-3574-ARPA
Contract SD-79, ARPA Order-189-61
N64-29919
See also AD-427 062.

Descriptors: (*Radar signals, Scattering), (*Plasma medium, Scattering), (*Electromagnetic waves, Scattering), Radar echo areas, Electron density, Distribution.

Consideration is given to the long-wavelength limit of the scattering of electromagnetic radiation in the transverse magnetic mode by infinite plasma cylinders with radially varying electron-density distributions. Techniques for calculating the scattering cross section are described for both increasing and decreasing electron-density distributions. Resonance phenomena peculiar to increasing electron-density distributions are discussed in some detail with specific numerical examples. Methods are presented for use in calculating the scattering cross section for radiation of arbitrary wavelength for monotonically decreasing electron-density distributions. Examples are given for the Gaussian electron distribution. (Author)

AD-634 787 **Field 20I**
CFSTI Prices: HC$6.00 MF$1.25
Stanford Univ., Calif. Inst. for Plasma Research.
COMPUTER SIMULATION OF ANOMALOUS PLASMA DIFFUSION AND NUMERICAL SOLUTION OF POISSON'S EQUATION.
Technical rept.,
by R. W. Hockney. May 66, 204p Suipr-53
Contracts Nonr-225 (83), AT (04-3)-326
Projs. NR-373-360, PA-8

Descriptors: (*Mathematical models, *Plasma physics), Diffusion, Numerical analysis, Fourier analysis, Transport properties.

The purpose of this research was to study the diffusion of a collisionless plasma across a constant magnetic field by means of a two-dimensional Lagrangian computer model. This model represents the plasma by means of approximately 1000 charged rods and calculates their motion, stepwise in time, as they move according to the laws of Newton and Maxwell. The model is quasi-electrostatic and takes 1.7 sec to perform a time-step on the IBM 7090 computer. The heart of the model is a fast, direct method, utilizing Fourier analysis, for solving Poisson's equation. For simple geometrical configurations, this technique is faster than the best iterative methods. The speed of the Poisson solver is made possible by the development of systematic techniques for performing Fourier analysis over certain numbers of points. These techniques, which reduce computer time by using the symmetries of the sine functions, are faster and more accurate than other published algorithms. Results of the investigation of anomalous diffusion were displayed in a 2-minute motion picture, which shows the position of every plasma particle and the shape of the potential surface. The buildup of a 'steady-state' potential distribution that is unstable can be observed in a sequence of frames. The diffusion, which can all be attributed to the coherent E-field of an unstable wave, is several orders of magnitude greater than that due to binary collisions in a real plasma with the same constants. Classical collisional diffusion between rods in the model is negligible, and the model simulates essentially collective phenomena such as instabilities and 'anomalous' diffusion.

AD-634 808 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INVESTIGATION OF PLASMA BY THE METHOD OF PROBING WITH BEAMS OF FAST PARTICLES.
by L. I. Krupnik, and N. G. Shulika. 16 Feb 66, 21p FTD-MT-65-101
TT-66-61582
Edited machine trans. of Predstavlennyi na vi Mezhdunarodnyi Simpozium po Ionizatsionnym Yavlentiyam v Gazakh, Parizh, Iyul, n.p. 1963 p1-25 n.d.

Descriptors: (*Plasma medium, Probes), (*Charged particles, Probes), Hydrogen, Ion beams, Density, USSR.

Identifiers: Plasma diagnostics.

Dense hydrogen plasmoids were investigated by probing them with beams of accelerated neutral and charged hydrogen particles. Investigations were made on the density of the plasmoid, its neutral component, its behavior in a magnetic field, and the radial distribution of plasma density in the plasmoid. (Author)

AD-634 926 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Royal Inst. of Tech., Stockholm (Sweden). Microwave Dept.
WAVES IN A HOT ELECTRON-HOLE PLASMA.
Scientific rept. no. 2, 1 May 65-31 Jan 66.
by J. M. Mayr. 1 Apr 66, 20p
Contract AF 61 (052)-888
AFCRL-66-439

Descriptors: (*Plasma oscillations, Microwaves), (*Microwaves, Propagation), Electrons, Sweden, Stability, Electric fields, Magnetic fields, Indium alloys, Antimony alloys.

Identifiers: Wave propagation, Indium antimonide.

The propagation of waves in a hot, magnetized electron-hole plasma is studied. The direction of wave propagation and the ratio of masses of the particles are arbitrary. The electron and hole densities are not necessarily equal but are constant throughout all space. Thermal motion is taken into account by a pressure term in the equations of motion. Detailed dispersion curves are calculated for those parameters which characterize indium antimonide at 77K. Various particle densities and directions of propagation are considered. The possibility of plasma instabilities is examined in the weak coupling approximation. Consequently those parts of the dispersion curves corresponding to electron waves are redrawn with doppler shifted frequencies corresponding to an electron drift velocity. The intersections of these curves with the unshifted parts indicate possible wave instabilities. (Author)

AD-635 155 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
California Inst. of Tech., Pasadena.
PULSE STIMULATED RADIATION FROM A PLASMA AT HARMONICS OF THE GYROFREQUENCY.
Technical rept.
by Wilhelm H. Kegel. Jun 66, 26p TR-32
Contract Nonr-220 (50)

Descriptors: (*Plasma medium, Cyclotron resonance phenomena), Resonance, Harmonics, Excitation, Electromagnetic pulses, Equations of motion.

Identifiers: Stimulated radiation.

A magneto-plasma excited by two short pulses at the gyrofrequency or a multiple thereof, is considered in the single particle approach. After the second pulse radiation maxima arise at the gyrofrequency and its harmonics. In a situation where the time separation of these maxima is tau* (in the simplest case tau* = tau) at the fundamental, it is tau/n at the n-th harmonic. As the resonances at the harmonics are a finite Larmor radius effect, excitation at these frequencies requires an initial energy. As an example, the case is studied where the first pulse has the gyrofrequency while the second has the frequency 2 (OMEGA-c). In this case radiation maxima arise with 2 (OMEGA-c) at times t sub L = L (TAU) (l ± 1,2,3,...) after the second pulse. At the fundamental the maxima arise at times t sub L = (2l - 1) TAU, where the maximum at the time TAU is initially due to the nonlinearity during the second pulse. (Author)

AD-635 226 **Field 20I, 14B**
CFSTI Prices: HC$4.00 MF$0.75
California Univ., Berkeley. Electronics Research Lab.
FAR INFRARED SPECTROMETER FOR MEASUREMENTS OF THE SYNCHROTRON RADIATION FROM A HOT ELECTRON PLASMA.
Research rept.
by S. Sesnic, and A. J. Lichtenberg. 29 Apr 66, 97p ERL-65-28
Contract AF 33 (615)-1078, Grant AF-AFOSR-139-64
Proj. AF-6899
Task 415001
Grant NSF-GP-2239

Descriptors: (*Plasma medium, Spectra (Infrared)), (*Infrared spectroscopy, Instrumentation), Measurement, Submillimeter waves, Filters (Electromagnetic waves), Indium al-

loys, Antimony alloys, Infrared optical systems, Infrared photoelectric cells.

A far-infrared spectrometer is constructed to measure the synchrotron radiation from a hot-electron plasma in the wavelength range between 0.1 and 4 mm. The echelette grating theory is reviewed, and the relevant formulae are derived. Utilizing the corrected Rowland's formula for the intensity distribution in various orders, the intensity distribution in the first and second order is calculated. Methods of filtering unwanted frequencies are described. A rather novel method, incorporating phase-space concepts, is used to design the spectrometer. Measurements of spectrometer transmission losses are presented, including losses of individual elements such as light pipes, right-angle bends, and quartz windows. Experimental determination of the filtering characteristics of echelette grating filters, NaCl transmission filters, and wire mesh reflection and transmission filters are given and their effectiveness compared. Theory and experiment are compared for the grating filters. The spectrometer is used to check the linearity of an InSb photodetector over approximately a two-decade power range. (Author)

LA-3369 **Field 20I**
CFSTI Prices: HC$3.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
DESIGN AND USE OF A HIGH-POWER LASER FOR PLASMA GENERATION STUDIES.
by Phillip N. Mace. Aug 65, 56p
Contract W-7405-eng-36

Descriptors: (*Plasma medium, Generators), (*Lasers, Plasma physics).

For abstract, see N 20 14.

N66-15346 **Field 20I**
CFSTI Prices: HC$4.00 MF$0.75
Electromagnetic Research Corp., College Park, Md.
A NONLINEAR TECHNIQUE FOR PLASMA DIAGNOSTICS.
Scientific rept. no. 3.
by W. W. Zachary. 30 Nov 65, 5p
Contract NASw-835
NASA-CR-69290

Descriptors: *Electromagnetic wave, *Magnetic field, *Plasma physics, *Wave propagation.

N66-16138 **Field 20I**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
A MAGNETOGASDYNAMIC POWER GENERATION STUDY.
Summary rept.
by F. H. Shair. 20 Jan 66, 60p
Contract NAS3-6260
NASA-CR-54475

Descriptors: *Electric conductivity, *Plasma power source, *Argon plasma, *Cesium, *Magnetogasdynamics.

N66-16554 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
ERROR IN INDUCED ELECTRIC FIELD MODES UNDER STIX COIL RESULTING FROM ASSUMPTION OF ORTHOGONALITY OF NATURAL PLASMA MODES.
by R. R. Woollett. Feb 66, 31p NASA-TN-D-3255

Descriptors: *Bessel function, *Current sheet, *Electric field, *Orthogonal function, *Plasma wave.

N66-16939 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
SEMICLASSICAL APPROACH TO CAPTURE COLLISIONS BETWEEN IONS AND POLAR MOLECULES.
by J. V. Dugan, and J. L. Magee. Feb 66, 48p
NASA-TN-D-3229

Descriptors: *Molecular collision, *Ionic collision, *Ionization cross section, *Quantum mechanics.

ORNL-3938 **Field 20I, 18A**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
PRELIMINARY REPORT ON BALL LIGHTNING.
by J. Rand McNally Jr. May 66, 22p
Contract W-7405-eng-26

Descriptors: (*Lightning, Plasma medium), (*Plasma physics, Thermonuclear reactions).

Identifiers: Ball lightning.

For abstract, see N 20 14.

AD-634 799 **See Field 7D**

AD-634 954 **See Field 7D**

AD-635 193 **See Field 5A**

AD-635 254 **See Field 20D**

AD-635 459 **See Field 10B**

AEC-TR-6670 **See Field 18A**

20J. QUANTUM THEORY

AD-634 779 **Field 20J, 7D, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
ON SECOND ORDER PERTURBATION ENERGIES AND HYPERVIRIAL RELATIONS.
by A. M. Arthurs, and P. D. Robinson. 17 May 66, 10p WIS-TCI-172
Contract DA-11-022-ORD-2059, Grant NsG-275-62

Descriptors: (*Perturbation theory, Energy), Equations of state, Wave functions, Hamiltonian.

A hypervirial criterion for the second order energy correction En Exp. (2) to vanish is examined in the context of standard perturbation theory. For ground state wave functions, the criterion leads to the trivial situation in which both the unperturbed and perturbed Hamiltonians have the same set of eigenfunctions. The first order correction to a non-zero En Exp. (2) under a second perturbation is shown to vanish if another hypervirial criterion is satisfied. (Author)

AD-634 844 **Field 20J**
CFSTI Prices: HC$2.00 MF$0.50
Uppsala Univ. (Sweden). Quantum Chemistry Group.
DERIVATION OF THE PRINCIPLE OF COMPENSATION OF DANGEROUS DIAGRAMS.
by Donald H. Kobe. 15 Oct 64, 29p Scientific-32
Contract AF 61 (052)-701
ARL-66-0122

Descriptors: (*Elementary particles, Mathematical models), N-body problem, Transformations, Operators (Mathematics), Hamiltonian, Nuclear energy levels, Perturbation theory, Graphics, Hartree-Fock approximation, Sweden.

Identifiers: Compensation of dangerous diagrams, Quasiparticles.

The compensation of the lowest order dangerous diagram is analogous to a Hartree-Fock procedure to determine the coefficients for the Bogoliubov quasi particles. This procedure is generalized in analogy with the Brueckner extension of the Hartree-Fock procedure by replacing the potential with the reaction operator (t-matrix) to obtain the principle of compensation of dangerous diagrams (PCDD). The PCDD is expanded by time dependent perturbation theory to third order, and it is shown that ladder diagrams are not important. (Author)

AD-635 253 **Field 20J, 20H**
CFSTI Prices: HC$6.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
DIRAC MONOPOLE SEARCH.
Technical rept.
by Harry Berkowitz, and Stanley Kronenberg.
May 66, 37p ECOM-2710
Proj. DA-1L0-13001-A91A-12-37

Descriptors: (*Elementary particles, Theory), Magnetic moments, Electric moments, Quantum mechanics, Pair production, Cosmic rays.

Identifiers: Dirac monopoles.

The general aspects of the Dirac monopoles are discussed. A novel experiment is proposed by means of which one could prove the existence of the monopoles with magnetic charge g = 137 e provided that the cross section for their production is larger than 10 to the -38th power sq. cm above the required threshold energy. (Author)

N66-15433 **Field 20J**
CFSTI Prices: HC$1.00 MF$0.50
Nihon Univ., Tokyo (Japan). Dept. of Physics.
A REFORMULATION OF THE QUARK MODEL IN TERMS OF NEUMANN'S GEMISCH.
by O. Hara. 1965, 18p NUP-65-13

Descriptors: *Baryon, *Neumann problem, *Quantum mechanics, *Dynamic model.

For abstract, see T 66 16.

N66-16421 **Field 20J**
CFSTI Prices: HC$6.00 MF$3.00
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CALCULATIONS OF THERMAL, FIELD EMISSION FOR A TERMINATED IMAGE POTENTIAL.
by J. F. Morris. 1966, 612p NASA-SP-3023

Descriptors: *Electron emission, *Field emission, *Image, *Potential field, *Thermal emission.

AD-634 780 **See Field 7D**

AD-634 811 **See Field 20F**

AD-634 843 **See Field 18K**

AD-635 191 **See Field 12A**

20K. SOLID MECHANICS

AD-634 833 **Field 20K**
CFSTI Prices: HC$1.50 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
STABILITY OF SYSTEMS POSSESSING PROPERTIES OF CREEP.
by A. R. Rzhanitsyn. 15 Feb 66, 22p FTD-MT-65-171
TT-66-61593
Edited machine trans of mono. Akademiya Nauk SSR. Sibirskoe Otdelenie. Institut Gidrodinamiki.

Trudy. Polzuchest i Dlitelnaya Prochnost, Novosibirsk, 1963 p15-28.

Descriptors: (*Creep, *Mechanics), USSR, Equation of motion, Equation of state, Stability, Differential equations, Linear systems, Nonlinear systems, Equations.

For abstract, see T 66 16.

AD-634 840 **Field 20K, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INTEGRO-DIFFERENTIAL EQUATIONS OF A PROBLEM FOR EQUILIBRIUM OF SHELLS OF ROTATION OF VARIABLE THICKNESS,
by G. I. Tkachuk. 21 Jan 66, 13p FTD-TT-65-1378
TT-66-61591
Unedited rough draft trans. of Prikladnaya Mekhanika (USSR) v7 n3 p266-71 1961.

Descriptors: (*Elastic shells, Mathematical analysis), (*Integral equations, Differential equations), Bodies of revolution, Structural shells, USSR.

N. A. Kilchevsky's method is employed to deduce a system of integro-differential equations for the equilibrium of shells of rotation of variable thickness with an arbitrary load and arbitrary boundary conditions. A 'chart' of mean surfaces is constructed for the shells, the kernels of systems of integro-differential equations and the components of the auxiliary concentrated forces are calculated. The author notes that the solution of concrete problems may be obtained by digital methods with the aid of quick-response computers. (Author)

AD-634 987 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
CREEP OF VARIABLE THICKNESS CIRCULAR PLATES.
Doctoral thesis (scientific).
by B. Venkatraman, Coleman Raphael, and Sharad A. Patel. Jun 66, 51p PIBAL-921
Contract AF 49 (638)-1360
Proj. AF-9782
Task 978201
AFOSR-66-0871

Descriptors: (*Disks, *Creep), Metal plates, Thickness, Numerical analysis, Loading (Mechanics), Moments, Tables, Graphics, Deflection, Equations of motion, Plasticity, Theory.

The report is concerned with the creep behavior of rotationally symmetric circular plates of varying thicknesses. The investigations are essentially based upon two types of analogies. In the first case, the analogy between the equations that govern the creep of a structure and those that govern the nonlinear elastic behavior of the same structure is used. In the other case, the similarity between creep flow and the flow rules of plasticity theory is utilized. Within the framework of these analogies, two exact methods of solution are initially presented. While the first is based upon a creep flow law associated with the Mises criterion of plasticity theory, the second uses the Tresca criterion of the same theory to formulate moment-curvature relations. These laws are then used as bases to obtain moment and deflection solutions for the case of a simply-supported plate under uniform pressure. Next, with a view towards developing approximate methods of solution for the analysis of more complex problems, Reissner's variational theorem is used to obtain solutions to the preceding problem. These are found to be in good agreement with the exact results. The approximate technique is then used to obtain solutions in the case of a plate with clamped edges. The results in all cases are presented in tabular, as well as graphical forms. These are discussed in a final chapter of the report. (Author)

AD-635 003 **Field 20K, 11F**
CFSTI Prices: HC$6.00 MF$1.50
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELASTIC-PLASTIC MATERIAL RESPONSE TO SUBMICROSECOND UNIAXIAL STRESS.
Master's thesis.
by Charles Edward Harris. Mar 66, 289p GSP/PH/66-9

Descriptors: (*Aluminum alloys, Impact tests), (*Impact shock, Aluminum alloys), Shock (Mechanics), Hypervelocity guns, Stresses, Elasticity, Plasticity, Measurement, Strain (Mechanics), Quartz, Targets, Shock waves, Experimental data, Numerical analysis, Surface properties.

Identifiers: Aluminum alloy 6061-T6.

Flat samples of 6061-T6 aluminum were impulse loaded with 50 mil x-cut synthetic quartz fliers using a 2.5 inch air gun. An oscillograph record of shock pressure as a function of time was obtained from the rear of the sample using piezoelectric quartz pressure transducers. The fliers were laterally supported and their characteristic low acoustic impedance and high dynamic elastic limit relative to the target material provided square wave pressure loading on the impact surface of the target. The dynamic strain response of the material is calculated from the oscillogram after applying correction for tilt which includes modifications for determining the magnitude of the Bauschinger effect during the rare-faction process. The observed specific impulse from the oscillograms agree well with the input specific impulse measured from sabot velocity and peak calculated stress except where peak stresses were lost in sabot tilt. The magnitude of reverse yield stress in 6061-T6 Al was determined to be 1.3 times the dynamic elastic limit. The overtaking relaxation model proposed by Zubabakin is essentially verified by the unresolvability of peak stresses from sample thicknesses approaching 1 centimeter. This effect accounts for low apparent strain values during rarefaction on some shots. (Author)

AD-635 019 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
TRANSIENT NON-AXISYMMETRIC WAVE PROPAGATION IN AN INFINITE ELASTIC PLATE.
Technical rept.
by Richard A. Scott, and J. Miklowitz. Jun 66, 40p TR-3
Contract Nonr-220 (57)
Proj. NR-064-487

Descriptors: (*Mechanical waves, Propagation), (*Elasticity, Mechanical waves), Equations of motion, Acoustics, Flat plate models, Rods.

The solutions to a general class of transient non-axisymmetric wave problems involving an infinite elastic plate are presented. The equations of motion from linear elasticity theory are employed and the solutions are obtained through the use of superposition and multi-integral transform techniques. The method of stationary phase is applied to obtain the predominant far-field disturbance for two particular problems, namely the sudden application of symmetric point shear and normal half-ring loads, and a numerical study is given in the former case. (Author)

AD-635 025 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept of Mechanical Engineering.
INFLUENCE OF TRANSVERSE SHEAR AND EDGE CONDITION ON NONLINEAR VIBRATION AND DYNAMIC BUCKLING OF HOMOGENEOUS AND SANDWICH PLATES,
by Yi-Yuan Yu, and Jai-lue Lai. Jun 66, 23p Scientific-8
Contract AF 49 (638)-1290
Proj. AF-9782
Task 978201
AFOSR-66-0863

Descriptors: (*Structural parts, *Shear stresses), Vibration, Buckling (Mechanics), Sandwich construction, Dynamics, Nonlinear systems.

In a previous paper the variational equation of motion was applied to the nonlinear analysis of dynamic buckling of simply supported homogeneous (Timoshenko beam) and sandwich plates executing plane-strain motion. To investigate the influence of the edge condition and the interaction between the edge condition and transverse shear effect, the analysis is further extended in this paper to such plates with clamped edges. Results show that the transverse shear effect is much greater for sandwich than for homogeneous plates. They further show that the shear effect is always greater for the clamped than for the simply supported case and is in fact not entirely negligible even for a homogeneous plate if it is clamped. The same conclusions apply to nonlinear vibrations of such plates, which are also investigated. (Author)

AD-635 045 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
THERMAL BUCKLING OF CONICAL SHELLS HEATED ALONG A GENERATOR,
by Dror Bendavid, and Josef Singer. Feb 66, 48p SUDAAR-258
Contract AF 49 (638)-1276
Proj. AF-9782
Task 978201
AFOSR-66-0649

Descriptors: (*Thermal stresses, *Structural shells), Buckling (Machanics), Numerical analysis, Generators.

Thermal buckling of conical shells heated along a generator of the cone is analyzed by Rayleigh-Ritz approach in conjunction with displacement functions modified by a shape factor. A two-term solution is presented in detail and numerical results are correlated with a typical experiment. (Author)

AD-635 095 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
ON THE EQUATIONS FOR AXISYMMETRIC DEFORMATION OF SHALLOW SHELLS OF REVOLUTION.
Scientific rept.
by K. A. V. Pandalai, and Clive L. Dym. Apr 66, 35p SUDAAR-267
Contract AF 49 (628)-1276
Proj. AF-9782
Task 978201
AFOSR-66-0724

Descriptors: (*Deformation, *Structural shells), Equations of motion, Bodies of revolution.

The equations governing the axisymmetric deformation of shallow shells (caps) of revolution are derived without introducing the simplifying assumption concerning the transverse shear force that is basic to the Mushtari-Vlasov approximation of thin shell theory. The equations derived are then specialized for the case of shallow spherical caps and compared with the Reissner equation which is a special case of the Mushtari-Vlasov approximation. Two problems are solved and the results are compared with the corresponding solutions of the Reissner equation. (Author)

AD-635 096 Field 20K
CFSTI Prices: HC$6.00 MF$0.75
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
PLASTICITY.
Scientific rept.,
by B. Venkatraman. Apr 66, 95p PIBAL-916
Contract AF 49 (638)-1360
Proj. AF-9782
Task 978201
AFOSR-66-0709

Descriptors: (*Plasticity, Reports), Solids, Structures, Loading (Mechanics), Stresses, Deformation, Mathematical analysis.

The present report is an introduction to the subject of plasticity on a microscopic scale. A coherent presentation of the material has been attempted, with the principal aim of drawing attention to significant developments. In the latter context, limitation of space has precluded the discussion of each and every topic that come under the heading of plasticity. Thus, for example, the phenomena of creep, plastic waves and plastic buckling have not been included. However, omission of lengthy descriptions and derivations has enabled the treatment of a reasonably wide range of topics. While the basic concepts are discussed in the first chapter, the subsequent chapters deal with the solution of problems. Here, the choice of problems has been guided by their simplicity in illustrating the theory and are by no means complete. For details of analyses and the treatment of more advanced problems, the reader must refer to the books and papers cited at the end of the report. (Author)

AD-635 116 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
INEXTENSIONAL BUCKLING CONFIGURATION OF CONICAL SHELLS.
Rept. on Technical Information Series.
by Anthony P. Coppa. Feb 66, 26p R66SD7
Contract AF 33 (657)-10220
Presented at the AIAA Aerospace Science Meeting (3rd), New York City, 24-28 Jan 66.

Descriptors: (*Buckling (Mechanics), *Structural shells), Conical bodies, Compressive properties.

Relations describing the geometrical forms taken by a thin conical shell when it shortens under axial compressions by pure folding are presented. These forms are convex polyhedral surfaces characterized by two distinct sets of triangular planes, one rotated toward (called the (+) surface) and the other away from (called the (-) surface) the generatrix of the underformed cone. The number of circumferential waves in each row remains constant along the length of the shell, with the size varying according to the cone diameter. The (+) and (-) surface have distinct aspect ratios, the (-) surface being always the more slender in the circumferential direction. The relations are valid for all degrees of axial shortening including that corresponding to total collapse. Collapse patterns obtained from experiments are shown to agree well with those constructed from the theory. (Author)

AD-635 124 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Test Station, China Lake, Calif.
MOTION OF A SPINNING BODY EQUIPPED WITH A DYNAMIC DAMPER CONTAINING VISCOUS FRICTION.
Research rept.
by Prescott D. Crout. Jun 66, 42p NOTS-TP-3761
NAVWEPS-8715

Descriptors: (*Spin, Damping), Friction, Viscosity, Motion, Dynamics, Spheres, Torque, Differential equations, Geometric forms, Frequency, Mathematical analysis.

The effect of a linear dynamic damper with viscous friction on the motion of a spinning body having an axis of dynamic symmetry is determined. Expressions for the natural frequencies and the time constants of the system are obtained, after which the motion of the system due to a unit torque impulse normal to the axis of symmetry is determined. Finally, the motion due to any given torque-time relationship is determined. (Author)

AD-635 126 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
CREEP IN THE PRESENCE OF A LINE LOAD ON THE BOUNDARY OF AN INFINITE HALF-SPACE.
by B. Venkatraman. May 66, 12p PIBAL-919
Contract AF 49 (638)-1360
Proj. AF-9782
Task 978201
AFOSR-66-0945

Descriptors: (*Creep, Solids), Loading (Mechanics), Elasticity, Tensor analysis.

The plane strain problem of the creep of a semi-infinite solid subjected to a slanted line load on its horizontal boundary is considered in the present report. Closed form solutions are derived for creep stresses and displacements. (Author)

AD-635 133 Field 20K
CFSTI Prices: HC$3.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Mechanical Engineering.
AXISYMMETRIC VIBRATIONS OF HOMOGENEOUS AND SANDWICH SPHERICAL CAPS.
by Bernard Koplik, and Yi-Yuan Yu. Mar 66, 52p
Scientific-7
Contract AF 49 (638)-1290
Proj. AF-9782
Task 978201
AFOSR-66-0582

Descriptors: (*Vibration, *Sandwich construction), (*Structural shells, Vibration), Shear stresses, Spheres, Equations of motion.

From the generalized variational equation of motion is derived a complete system of equations for sandwich as well as homogeneous spherical shells including the effect of thickness-shear deformation. Based on these equations the exact solution is obtained for the natural frequencies of homogeneous and sandwich spherical caps with clamped edges. Emphasis in our investigation is on the transition from the vibrations of a circular disk to those of a spherical cap, for both homogeneous and sandwich cases, with numberical results showing the effects of thickness-shear and of curvature. An approximate solution is finally deduced from the exact solution. (Author)

AD-635 138 Field 20K
CFSTI Prices: HC$6.00 MF$0.50
Technion - Israel Inst. of Tech., Haifa.
RESEARCH ON SECOND ORDER EFFECTS IN THE ELASTIC RESPONSE OF METALS.
Annual technical rept. no. 2, 1 Jul 65-30 Jun 66.
by Markus Reiner. 30 Jun 66, 20p
Contract N62558-4482

Descriptors: (*Cylindrical bodies, Elasticity), Deformation, Metals, Strain (Mechanics), Stresses, Mathematical analysis, Israel.

Using the Green, Almansi and Hencky measures of finite strain, the elastic response of a circular cylinder in torsion is calculated under the assumption that a change of length is prevented. It is found that this requires the application of axial pressures at the ends. (Author)

AD-635 176 Field 20K
CFSTI Prices: HC$4.00 MF$0.50
California Univ., Berkeley. Div. of Applied Mechanics.
THE LINEAR THEORY OF AN ELASTIC COSSERAT PLATE.
by P. M. Naghdi, and A. E. Green. Apr 66, 37p
AM-66-4
Contract Nonr-222 (69)
Proj. NR-064-436
Prepared in cooperation with Newcastle-upon-Tyne (England).

Descriptors: (*Flat plate models, Theory), Elasticity, Bending, Surfaces, Deformation.

Identifiers: Cosserat surface.

Some features of the linear theory of an elastic Cosserat Plate are discussed and special attention is given to a bending theory for isotropic materials. A useful representation for the solution of the system of differential equations characterizing the bending of an isotropic and elastic Cosserat plate is deduced, and the results are applied to the problem of an infinite Cosserat Plate with a circular hole, the plate being in a state of uniform bending at infinity. (Author)

AD-635 177 Field 20K, 20M
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Div. of Applied Mechanics.
LINEAR NON-ISOTHERMAL VISCOELASTIC SOLIDS.
by R. M. Christensen, and P. M. Naghdi. Apr 66, 23p AM-66-5
Contract Nonr-222 (69)
Proj. NR-064-436

Descriptors: (*Viscoelasticity, Thermodynamics), Solids, Deformation, Energy, Equations, Theory, Entropy, Stresses, Heat, Inequalities.

Identifiers: Free energy.

With the use of a suitable representation for the free energy, explicit forms of the constitutive relations, the dissipation function and related thermodynamical restrictions are derived for infinitesimal deformation of linear non-isothermal viscoelastic solids. Some remarks on further restrictions, consistent with the dissipation inequality, are included for isotropic materials. (Author)

AD-635 463 Field 20K
CFSTI Prices: HC$3.00 MF$0.50
Brown Univ., Providence, R. I. Div of Applied Mathematics.
WAVES IN MATERIALS WITH MEMORY. V. ON THE AMPLITUDE OF ACCELERATION WAVES AND MILD DISCONTINUITIES.
Technical rept.
by Bernard D. Coleman, James M. Greenberg, and Morton E. Gurtin. Feb 66, 56p TR-9
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Viscoelasticity, *Continuum mechanics), Propagation, Mechanical waves, Acceleration.

This paper studies one-dimensional acceleration waves and higher-order waves in general nonlinear materials with memory. Explicit expressions are derived for the time-dependence of the amplitude of such waves without assuming the material ahead of the waves to be undistorted or homogeneous. (Author)

AD-635 481 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
BUCKLING AND POSTBUCKLING OF AN AXIALLY COMPRESSED OVAL CYLINDRICAL SHELL.
Scientific rept.
by Joseph Kempner, and Youl-Nan Chen. Apr 66, 62p PIBAL-917
Contract AF 49 (638)-1360
Proj. AF-9782
Task 978201
AFOSR66-0870
Prepared for presentation at the Anniversary Symposium on Shells to Honor Lloyd Hamilton Donnell (70th) University of Houston, Aril 4-6 1966.

Descriptors: (*Buckling (Mechanics), *Structural shells), Cylindrical bodies, Potential theory, Numerical analysis.

Energy expressions and related differential equations for non-circular cylindrical shells, analogous to the corresponding relations presented by Donnell for thin-walled circular cylindrical shells, are summarized. Appropriate energy expressions are then applied to the classical buckling and to the nonlinear postbuckling problems of an axially compressed oval cylinder whose cross section is characterized by a simplified form of an expression proposed by Marguerre. In the case of classical buckling, the results show, for a range of major-to-minor axis ratio of the cross section lying between 1 (the circular cylinder) and 2.06, that the out-of-roundness has a marked effect on the critical load, and that introduction of the maximum radius of curvature into the formula for the classical buckling stress of a circular cylinder leads to good results for thin-walled shells of moderate eccentricity of the cross section. The postbuckling behavior is investigated through the application of the principle of stationary potential energy together with an approximate deflection function. The latter represents a modification of the expression applied earlier by the authors. The new results show that, in addition to the previously observed relative minimum postbuckling load, a relative maximum postbuckling load can exist. Furthermore, for controlled end-displacement loading, the large-deflection load vs end-shortening curve can correspond to stable equilibrium configurations throughout the entire loading range, whereas for dead-weight loading the region of the curve between the maximum and the minimum loads represents unstable configurations. (Author)

N66-15385 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ADVANTAGES OF MULTIPOINT CONTROL FOR VIBRATION TESTING OF COMPLETE RANGER SPACECRAFT.
by J. L. Cooper. 1 Jan 66, 23p JPL-TR-32-847
Contract NAS7-100
NASA-CR-69353

Descriptors: *Control system, *Ranger block III, *Spacecraft, *Vibration testing.

For abstract, see T 66 16.

N66-16546 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
STRUCTURAL CONCEPTS FOR HYDROGEN-FUELED HYPERSONIC AIRPLANES.
by J. G. Davis Jr, L. R. Jackson, and G. R. Wichorek. Feb 66, 46p NASA-TN-D-3162

Descriptors: *Hydrogen fuel, *Hypersonic aircraft, *Structural design.

N66-16552 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FRACTURE MECHANICS OF THROUGH-CRACKED CYLINDRICAL PRESSURE VESSELS.
by R. B. Anderson, and T. L. Sullivan. Feb 66, 35p NASA-TN-D-3252

Descriptors: *Pressure vessel, *Fracture mechanics, *Material testing.

PB-169 843 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.75
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
STATIC BENDING TESTS ON LONGITUDINALLY STIFFENED PLATE GIRDERS.
by Michael A. D'Apice, and Peter B. Cooper. Apr 65, 66p Fritz Engineering Lab-304.5

Descriptors: (*Beams (Structural), Bending), Captive tests, Reinforcing materials, Buckling (Mechanics), Loading (Mechanics), Stresses, Distribution, Deflection, Tensile properties.

The report describes static bending tests of five longitudinally stiffened plate girders. The experimental variables were the panel size and longitudinal stiffener size. The primary test objectives were: (1) to determine to what extent longitudinal stiffeners can contribute to the resistance of the web to vertical buckling of the compression flange, (2) to determine how the stress redistribution at loads above the theoretical web buckling load is affected by the presence of a longitudinal stiffener and (3) to determine to what extent lateral web deflections can be reduced by the use of a longitudinal stiffener. The test setup and test procedure are described and the results are analyzed and discussed. It is concluded that the longitudinal stiffeners were effective in retarding stress redistribution and in controlling web deflections, but for the stiffener sizes used in these tests, no significant increase in bending strength due to the presence of longitudinal stiffeners was observed. (Author)

PB-169 844 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.75
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
STATIC SHEAR TESTS ON LONGITUDINALLY STIFFENED PLATE GIRDERS.
by David J. Fielding, and Peter B. Cooper. Dec 65, 6pp Fritz Engineering Lab-304.7

Descriptors: (*Beams (Structural), Shear stresses), Reinforcing materials, Captive tests, Tensile properties, Deflection, Panels (Structural).

The report describes eight static shear tests on four longitudinally stiffened plate girders. The experimental variables were the panel aspect ratio, transverse stiffener size, and longitudinal stiffener location and size. The primary objectives of the tests were to determine the effect of longitudinal stiffeners on the static behavior of plate girder panels subjected to high shear and to determine the contribution of longitudinal stiffeners to the static shear strength of plate girders. The test setup and test procedure are described and the results are analyzed and discussed. It is concluded that the longitudinal stiffeners were effective in controlling web deflections, forcing separate tension fields to develop in the subpanels formed by the longitudinal stiffeners, and thereby increasing the shear strength of the girders. (Author)

PB-169 932 **Field 20K, 13M**
CFSTI Prices: HC$2.60 MF$0.50
National Swedish Inst. for Building Research, Stockholm.
DIAGRAMS OF CRITICAL STRESSES FOR COLUMNS OF MATERIAL WITHOUT TENSILE STRENGTH.
by Sven Sahlin. Dec 64, 19p Rept. no. 16:1965
Sponsored by grant from Research Fund.

Descriptors: (*Beams (Structural), Stresses), (*Walls, Stresses), Rectangular bodies, Tensile properties, Loading (Mechanics), Materials, Elasticity, Equations, Sweden.

The paper treats newly computed diagrams of critical stresses for eccentrically loaded rectangular columns or walls made of elastic material without tensile strength. The degree of eccentricity of the axial load applied was varied at both the upper and the lower end; at the lower end it was also varied in respect to its signs: + and-.

AD-466 040 **See Field 21I**

AD-634 876 **See Field 8G**

AD-635 077 **See Field 20L**

AD-635 141 **See Field 13J**

AD-635 269 **See Field 20D**

PB-170 354 **See Field 11L**

PNE-801F **See Field 18C**

20L. SOLID STATE PHYSICS

AD-432 272 **Field 20L, 7B, 11B**
CFSTI Price: HC$5.00
RCA Labs., Princeton, N. J.
SYNTHESIS AND CHARACTERIZATION OF ELECTRONICALLY ACTIVE MATERIALS.
Technical rept. no. 1, 15 May 63-15 Feb 64,
by L. R. Weisberg, and H. W. Leverenz. 15 Mar 64, 163p
Contract SD-182, ARPA order-446

Descriptors: (*Semiconductors, Materials), (*Refractory materials, Electrical properties), Aluminum compounds, Gallium compounds, Phosphides, Arsenic alloys, Solid solutions, Crystal growth, Diffusion, Metalloids, Band theory of solids, Bismuth, Antimony, Phonons, Ultrasonic radiation, Cadmium compounds, Sulfides, Optical properties, Thermionic emission, Synthesis (Chemistry), Gallium alloys.

Identifiers: Acousticoelectric effects, Aluminum phosphide, Cadmium sulfide, Gallium arsenide, Gallium phosphide.

Contents: Research on III-V compound semiconductors, aluminum phosphide, gallium arsenide, gallium phosphide, Gallium Arsenide-Phosphide Alloys, growth of gallium phosphide from the melt, review of diffusion in gallium arsenide, role of thermal spikes in electron bombarded semiconductors); Semimetals and low band-gap semiconductors; Phonon interactions in semiconductors (microwave ultrasonics, acoustoelectric effects in CdS); Optical properties of semiconductors; Research on refractory materials (arc-image furnace growth of refractory materials, thermionic emission from refractory metals).

AD-634 820 **Field 20L, 7D, 20F, 20B K**
CFSTI Prices: HC$3.00 MF$0.75
Materials Science Center, Cornell Univ., Ithaca, N. Y.
OPTICAL STUDY OF EXCITONS IN MIXED ALKALI HALIDES: KI-KBr.
Doctoral thesis,
by Hung Kuen Alan Kan. Feb 66, 100p Rept. no. 427
Supported in part by ARPA and ONR.

Descriptors: (*Alkali metal compounds, Optical properties), (*Potassium compounds, Optical properties), (*Bromides, Optical properties), (*Iodides, Absorption spectrum), Luminescence, Halides, Crystals, X-ray diffraction analysis, Phase studies, Band spectrum, Photons, Excitation.

Identifiers: Potassium bromide, Potassium iodide.

The absorption and luminescence properties of KI-KBr mixed crystals were studied over a wide range of KI concentrations. In all systems an absorption band was found which was attributed to a localized exciton formed at an I (-)-site. The position of the band shifts toward the first exciton absorption peak of pure KI with increasing I- concentration. For dilute I (-)-concentrations the width of the band is twice as large as the width of pure KI or the 82 mole% KI sample. It was also found that the low photon energy absorption edge of this band was an exponential function of photon energy (Urbach's rule) in all mixtures. All the KI-KBr mixed crystals showed a strong luminescence at 80K when excited in the exciton absorption band. In all cases two emission bands were ob-

served. The existence of Urbach's rule and occurence of two emission bands in these mixed-halide crystals is compared with the similar behavior of pure alkali halides. (Author)

AD-634 879 **Field 20L, 20B**
CFSTI Prices: HC$1.50 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash.
CALCULATION OF THE PHYSICAL PROPERTIES OF DEFECTS IN CRYSTALS BY APPROXIMATE SELF-CONSISTENT-FIELD METHODS.
by Emmett B. Moore Jr. May 66, 12p D1-82-0536

Descriptors: (*Crystal lattice defects, Physical properties), (*Molecular orbitals, Crystal lattice defects), Field theory, Approximation (Mathematics), Wave functions, Hartree-Fock approximation, Groups (Mathematics).

The rigorous Roothaan-Hartree-Fock linear-combination-of-atomic-orbitals self-consistent-field (RHF-LCAO-SCF) method of calculating the physical properties of small molecules may be extended by the use of suitable approximations and group theory to molecules which may be regarded as small regions of a crystal containing a defect. An outline is given of the rigorous RHF-LCAO-SCF method, the relation between this method and the simpler extended-Hukel-theory (EHT) which has previously been used to calculate some of the properties of defects in graphite is shown, and it is demonstrated how the RHF-LCAO-SCF method may be approximated to permit calculations of the physical properties of defects in crystals. This approximation of the SCF method has the advantage of being applicable to large molecules (or regions in a crystal) while being much more rigorous than the EHT method and nearly as rigorous as the parent SCF method.

AD-634 905 **Field 20L, 7E**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Radiation and Solid State Lab.
PHOTOGENERATION OF CHARGE CARRIERS IN TETRACENE.
by Nicholas Geacintov, Martin Pope, and Hermit Kallmann.25 Apr 66, 39p

Descriptors: (*Polycyclic compounds, *Photoelectric effect), (*Fluorescence, Polycyclic compounds), (*Carriers (Semiconductors), Polycyclic compounds), Photoconductivity, Semiconductors, Organic materials, Single crystals, Photons, Band theory of solids, Electron transitions.

Identifiers: Naphthacenes, Organic semiconductors, Quantum efficiency.

The photocurrent and photovoltage of tetracene single crystals with aqueous electrodes were studied as a function of the excitation wavelength in the 220-560 millimicron region. The fluorescence efficiency of these crystals was studied in the same wavelength region. At wavelengths longer than 410 millimicron the photocurrent is due to injection of holes at the illuminated electrode. A bulk generated (electron) photocurrent is shown to be produced with excitation energies in excess of 3 eV, i.e. at wavelengths less than 410 millimicrons. The relative fluorescence efficiency begins to decrease with decreasing wavelengths at 410 millimicrons. The drop in fluorescence efficiency at excitation energies greater than 3 eV is attributed to the appearance of a non-radiative competitive process. The wavelength dependence of the bulk generated negative photocurrent is related to varying probabilities of transition from the different excited electronic states of the crystal to ionized states. The wavelength dependence of the photovoltage is strongly dependent on the negative charge density and exhibits minima in wavelength regions where this density is highest.

AD-634 906 **Field 20L**
CFSTI Prices: HC$5.00 MF$1.00
Franklin Inst. Research Labs., Philadelphia, Pa.
PARAMAGNETIC IMPURITIES IN IONIC CRYSTALS.
Final scientific rept. for 25 Jan 66.
by A. Neaves, C. Lin, and G. S. Tint. Feb 66, 163p
Contract AF 33 (659)-10068
Proj. AF-7021
Task 702102
ARL-66-0031

Descriptors: (*Crystals, Impurities), (*Transition elements, Atomic energy levels), (*Paramagnetic resonance, *Manganese), (*Yttrium compounds, Oxides), Paramagnetic materials, Lithium compounds, Fluorides, Molecular orbitals, Valence, Chemical bonds, Ferromagnetic materials, Luminescence, Crystal lattice defects, Aluminum compounds, Sodium compounds, Ammonium compounds, Chlorides, Copper.

Identifiers: Aluminum oxides, Ammonium chlorides, Lithium fluoride, Sodium chloride, Thermoluminescence, Yttrium oxide.

The report deals primarily with the results obtained on the systems LiF:Mn (2+) and Y2O3. The theoretical aspects of S-state transition metal ions in host-crystals is dealt with and applied to Mn (2+) in lithium fluoride. It is found that the method of molecular orbitals used to consider problems of limited covalency is not valid throughout the whole range of Mn (2+) F (-) bond distances. The possible role of ferromagnetic impurities in yttria and their relation to thermoluminescence in that materials is discussed. A point charge calculation of the crystalline electric field acting on Fe (3+) situated on the 8b site in yttria is detailed. The systems alpha-A12O3, NaCl:Cu (2+) and NH4Cl:Mn (2+) are discussed briefly. (Author)

AD-635 005 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania Univ., Philadelphia. Dept. of Physics.
DIELECTRIC RELAXATIONS IN ADDITIVELY COLORED KCl AND KCl:SrCl2 CRYSTALS.
Technical rept.
by Cesare Bucci. Jul 66, 35p TR-7
Contract Nonr-551 (28)

Descriptors: (*Chlorides, Dielectric properties), (*Color centers, Dielectric properties), (*Potassium compounds, Chlorides), (*Strontium compounds, Chlorides), Ionic currents, Absorption spectrum, Band spectrum, Impurities, Dipole moments, Electric moments, Crystal lattice defects.

Identifiers: Potassium chloride, Strontium chloride

The dielectric relaxations of additively colored alkali halides have been investigated by means of ionic thermocurrent (I. T. C.) and optical absorption measurements. In addition to the ITC bands present in non-colored KCl crystals, several new bands were found when F centers were partially converted to other centers such as F', M, N, R, Z, Z1, Z2, and Z3, by F-light irradiation at various temperatures. These additional ITC bands were found to be due to the migration of electrons rather than to the orientation of ionic dipoles. In the particular case of the Z2 centers, which can be obtained only in crystals containing metallic divalent impurities, ITC and field-induced dicroism measurements did not provide any evidence for the existence of an electric dipole moment of the Z2 center itself.Quantitative measurements of the impurity-vacancy dipole (I. V.) concentrations in KCl:SrCl2 crystals indicate, in addition, that the growth of the Z2 centers is accompanied by a decrease of the I. B. band. The proportionality constant between the number of Z2 centers created and the number of I. V. dipoles destroyed during the F to Z2 conversion was slightly more than three. These results support a model for the Z2 center having spherical symmetry and suggest that the process of formation of the Z2 centers is closely related to the association of I. V. dipoles into trimers. (Author)

AD-635 026 **Field 20L, 9A**
CFSTI Prices: HC$1.50 MF$1.00
Syracuse Univ. Research Inst., N. Y.
HETEROJUNCTION DEVICES.
Interim rept., 1 Dec 64-30 Nov 65.
by Richard L. Anderson, Girtz Zeidenbergs, S. Yawata, T. Huang, and D. Boyce. Jun 66, 188p
Rept. no. AR1-65
Contract AF 30 (602)-3637
Proj. AF-4159
Task 415912
RADC-TR-66-8

Descriptors: (*Semiconductor devices, Preparation), (*Silicon, Semiconductor devices), (*Germanium, *Epitaxial growth), Tellurium, Gallium compounds, Phosphides, Transport properties, Vapor plating, Chemical equilibrium, Optical properties, Electrical properties, Photoconductivity, Semiconducting film.

Identifiers: Gallium phosphide.

Using tellurium as a transport agent, n- and p-type silicon was deposited on n- and p-type GaP. Heterojunction devices of these deposits were made, their electrical and optical characteristics were determined, and energy band profiles, as well as current carrying mechanisms, are proposed to explain the majority of the experimental results. The deposition of Si upon GaP is carried out in a closed ampoule at about 850C. Transport of Si is believed to be due to temperature dependence of equilibrium constant of a chemical reaction involving silicon telluride compounds. The I-V characteristics with and without light, photocurrent-photo energy spectra for both bias polarities, and capacitance-voltage characteristics with and without light applied are discussed. Preliminary results on epitaxial deposition of Ge on Si are presented. In this epitaxial deposition process, GeC14 is used as source while Si substrates are used as seeds. Adequately thick and smooth deposits were obtained. Electrical and photo-conductivity measurements seem to indicate the existence of heterojunctions. (Author)

AD-635 077 **Field 20L, 20K**
CFSTI Prices: HC$3.00 MF$0.75
Naval Ordnance Lab., White Oak, Md.
PHONON SPECTRUM OF A SHOCKED SOLID.
by Paul Harris. 13 May 66, 87p NOLTR-66-43
Task R-360-FR105-PA-052

Descriptors: (*Phonons, Solids), (*Shock waves, *Solids), Viscoelasticity, Perturbation theory, Thermal conductivity.

A Boltzmann equation approach is used to investigate the phonon distribution in a solid undergoing finite amplitude shock loading. Phonon-phonon interactions, via the anharmonic content of the crystal, lead to a collision term in the spirit of the Callaway thermal conductivity model. The theory is used to consider the phonon-phonon attenuation of a shock wave. In order to complement the microscopic theory, some macroscopic theory is considered. (Author)

AD-635 228 **Field 20L, 9A, 18H**
CFSTI Prices: HC$5.00 MF$1.00
Nortronics, Newbury Park, Calif. Applied Research Dept.
STUDY FOR GENERALIZED MODEL FOR SEMICONDUCTOR RADIATION RESPONSE PREDICTION.
Quarterly progress rept. no. 4, 15 Sep 65-15 Feb 66.
by J. Raymond, and R. Johnson. 15 Feb 66, 156p
ARD-66-29R
Contract DA-28-043-AMC-00423 (E)
Task 16.0091
ECOM-00423-4
See also AD-631 367.

Descriptors: (*Semiconductor devices, *Radiation damage), (*Transistors, Radiation damage), (*Photoelectric effect (Gramma rays), Mathematical prediction), Transients, Mathematical models, Diodes (Semiconductor), Electric fields, Carriers (Semiconductors).

This report summarizes the previous year's work, as well as presenting developments during the fourth quarter. The detailed transistor study is emphasized, and shows that the accuracy of the calculated results depends on the accuracy of the calculated primary photocurrent and on the accuracy of the lumped-model parameters in representing the electrical behavior. If the common-emitter ionizing-radiation transient response is calculated without prior ionizing radiation experiments, the calculated result is generally lower than the observed response by about a factor of three over the range of common-emitter circuit parameters. If the internal carrier generation rates are adjusted such that the observed collector primary photocurrent agrees with the calculated waveform, the calculated common-emitter transistor response accurately follows the observed response. Here, accurately means certainly less than a factor of two in the worst combination of external circuit parameters, and usually much better than a factor of two. The Accuracy is limited by the detail of the representation of the transistor electrical parameters. The lumped-model representation of the transistor can accurately predict the critical electrical and ionizing-radiation induced transient response of widely varying types of devices. Important 'second-order' effects can be incorporated in the model directly, and always in terms of the basic semiconductor and geometrical parameters. The most serious problem seems to be the determination of the carrier generation rates in the transistor. Independent dosimetry can be used to characterize the exposure radiation environment, but effects of the more complex environment inside the transistor can also be considered. (Author)

AD-635 267 **Field 20L, 13K**
CFSTI Prices: HC$4.00 MF$0.75
Ion Physics Corp., Burlington, Mass.
HIGH ENERGY ION IMPLANTATION OF MATERIALS.
Rept. for 28 Dec 64-30 Apr 66.
by C. M. Kellett, W. J. King, F. W. Martin, P. McNally, and F. A. Leith. May 66, 110p
Scientific-1
Contract AF 19 (628)-4970
Proj. AF-4608
Task 460805
AFCRL-66-367

Descriptors: (*Semiconductors, *Doping), (*Transistors, Doping), (*Ion bombardment, Doping), Ion beams, Boron, Phosphorus, Zinc, Sulfur, Silicon, Silicon compounds, Carbides, Diamonds, Gallium alloys, Arsenic alloys, Processing, Diodes (Semiconductor), Sputtering, Annealing, Manufacturing methods.

Identifiers: Gallium arsenide, Silicon carbides.

The report describes investigations conducted on the implantation of high energy (>50 kev) dopant ions into semiconductors for the formation of controlled doped layers. Investigations were conducted with B and P ions for p- and n-type layers in Si, SiC and diamond, and Zn and S for p- and n-type layers in GaAs, respectively. Extensive theoretical and experimental work was performed in range-energy relationships in silicon to provide a firm foundation for device work. Results of these investigations were used in the fabrication of active devices, particularly a form of unipolar transistor which lends itself to implantation processing. Successful fabrication was demonstrated and high frequency types are currently being developed. Implanted doped layers were formed in GaAs, SiC and diamond with diode formation demonstrated in GaAs and diamond. Preliminary results indicate that ion implantation may be the best method for handling such materials. (Author)

AD-635 306 **Field 20L, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Rio Grande do Sul Univ., Porto Alegre (Brazil). Instituto de Fisica.
APPLICATION OF GAMMA-GAMMA ANGULAR CORRELATION TO THE STUDY OF INTERACTIONS BETWEEN NUCLEI AND THE ENVIRONMENT IN WHICH THEY ARE EMBEDDED.
Rept. no. 4, (Final) May 65-May 66.
by Fernando C. Zawislak. May 66, 15p
Grant DA-ARO-49-092-65-G72
Proj. DA-20014501B11B-00-004-LA

Descriptors: (*Nuclear spectroscopy, Solids), (*Gamma-ray spectroscopy, Nuclei), (*Solid state physics, Nuclear spectroscopy), Nuclear radiation spectrometers, Technetium, Cobalt, Indium, Nuclear energy levels, Lead, Dysprosium, Electric fields, Hafnium compounds, Magnetic fields, Brazil.

A series of experiments using an integral gamma-ray angular correlation apparatus was made. These include angular correlation measurements in 99Tc and 59Co, and g-factor measurements for an excited state in 115In. A conversion-electron-gamma-ray angular correlation apparatus previously constructed was further developed and exploited. It has proved to be a powerful tool for the study of nuclear properties. Studies are in progress for various cascades in the nuclei 207Pb and 160Dy. Studies were also made of internal electric fields in various compounds of Hafnium and in the study of internal magnetic fields acting on nuclei of diamagnetic atoms in solid solutions of ferromagnetic hosts. Construction has commenced on a Mossbauer effect apparatus.

AD-635 313 **Field 20L, 9E, 20C**
CFSTI Prices: HC$3.00 MF$0.75
Duke Univ., Durham, N. C. Dept. of Electrical Engineering.
THE USE OF ANISOTROPIC DIELECTRIC MATERIALS FOR OBTAINING MUTUAL CAPACITANCE.
Final rept., Jun 64-Jun 66.
by Theo C. Pilkington, and Robert B. Roe. 1 Jun 66, 69p
Grant DA-ARO (D)-31-124-G581
Projs. DA-20014501B31E, ARO (D)-5115-E
AROD-5115:2

Descriptors: (*Dielectrics, Anisotropy), Theory, Capacitance, Transformers, Gain, Dielectric amplifiers, Materials, Ferroelectric crystals, Piezoelectric crystals, Circuits, Voltage.

A generalized theoretical analysis of the anisotropy transformer and similar devices is developed. A transform-analog technique for the determination of optimum physical configurations for realization of mutual capacitance and voltage gain and for the determination of equivalent-circuit parameters is employed. The open-circuit voltage gain of the anisotropy transformer is shown to have an upper limit of unity under linear operation conditions and this demonstration is extended to include the general class of such devices. Since a linear-mode gain greater than unity is impossible, the non-linear properties of multi-terminal dielectric materials (specifically Rochelle salt) and their application as nonlinear elements in dielectric amplifier configurations is investigated. The use of Rochelle salt as a nonlinear element proves to be impractical and feasibility of nonlinear anisotropic coupling techniques in other oriented ferroelectric crystals is found to depend on poorly understood aspects of the macroscopic consequences of the mechanism of polarization reversal.

AD-635 400 **Field 20L, 9A**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Schenectady, N. Y. Research and Development Center.
NEW SOLID-STATE DEVICE CONCEPTS.
by N. Aven, R. N. Hall, J. R. Richardson, and H. H. Woodbury Jul 66, 30p Scientific-5
Contract AF 19 (628)-4976
Proj. AF-4608
Task 460805
AFCRL-66-350
See also AD-632 779.

Descriptors: (*Semiconductor devices, Materials), (*Lasers, Semiconductor devices), Semiconductors, Zinc alloys, Selenium alloys, Tellurium alloys, Diffusion, Diodes (Semiconductor), Gallium alloys, Arsenic alloys, Semiconducting films, Luminescence, Films.

Identifiers: Gallium arsenide, Zinc selenide.

Experiments on the diffusion of Se in ZnSe were made. This and earlier work indicate that in all the II-IV compounds the chalcogenide component diffuses by a mechanism other than simple vacancy diffusion. This result is of fundamental importance to an understanding of the defect structure of these materials. The electrical properties of the different components of ZnSe sub X Te sub (1-x) light emitting diodes at 80K have been investigated. The current-voltage characteristic of the junction region agrees with classical junction theory. Under self-illumination, the currents carried by the n- and p-type bulk regions were ohmic. The major current-limiting factor is the electrical contact to the p-type side of the junction. A mask changer and evaporation rate monitor are being assembled in order to improve the reproducibility of the GaAs switching diodes. Resistivity measurements of evaporated GaAs films yielded values in the 100,000 ohm-cm range at 300K. No Hall mobility has yet been detected. (Author)

AD-635 470 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Arizona State Univ., Tempe. Dept. of Chemistry.
PROTON CONDUCTIVITY IN PURE AND DOPED KH2PO4.
Technical rept.
by M. O'Keeffe, and C. T. Perrino. 1 Jun 66, 22p
TR-3
Contract Nonr-2794 (04)
Proj. NR-056-450

Descriptors: (*Potassium compounds, Electrical conductance), (*Phosphates, Electrical conductance), Doping, Crystal lattice defects, Protons, Ferroelectricity, Water vapor, Pressure.

Identifiers: Potassium dihydrophosphate.

The electrical conductivity of pure and KHSO4-doped KH2PO4 was measured over a wide range of temperatures under the equilibrium water vapor pressure. For pure KH2PO4, the conductivity perpendicular to the C axis is given by log sigma = -1.17 - 2760/T, T < 180C; log sigma = 2.0 - 3900/T, T > 180C. The conductivity of doped crystals is 0.00000106 C/ohm/cm, where C is the mole fraction of sulphate. The results are discussed in terms of the defects possible in KH2PO4. (Author)

N66-15331 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
NEGATIVE PHOTOCONDUCTIVITY ASSOCIATED WITH IMPURITY CONDUCTION IN GERMANIUM.
by E. A. Davis. 1965, 16p
Grant NsG-228-62
NASA-CR-69334

Descriptors: *Doping, *Photoconductivity, *Germanium, *Semiconductor device, *Solid state physics.

For abstract, see T 66 16.

N66-15383 Field 20L
CFSTI Prices: HC$2.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Engineering and Science.
RECOVERY OF ELECTRICAL PROPERTIES IN 45 MEV ELECTRON-IRRADIATED N-TYPE SI FROM 80 DEG K TO 350 DEG K.
by L. J. Cheng, and J. C. Corelli. 1965, 27p
Grant NsG-290
NASA-CR-69338

Descriptors: *Annealing, *Silicon, *Electric property, *Electron radiation, *Radiation effect.

N66-15811 Field 20L
CFSTI Prices: HC$3.00 MF$0.75
General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
RADIATION EFFECTS ON SILICON.
Final rept. 1 Jun 64-31 May 65.
by D. P. Snowden, and V. A. J. Van Lint. 21 Jul 65, 71p GA-6556
Contract NAS7-289
NASA-CR-69568

Descriptors: *Crystal structure defect, *Electron radiation, *Silicon.

N66-15959 Field 20L
CFSTI Prices: HC$1.00 MF$0.50
Martin Co., Baltimore, Md. Research Inst. for Advanced Studies.
SOLID STATE STUDIES IN CERAMIC ALLOYS.
Quarterly progress rept. no. 1, 31 Aug-30 Nov 65.
by J. D. Venables. 1965, 7p
Contract NASw-1290
NASA-CR-69622

Descriptors: *Boron, *Crystal structure, *Titanium carbide.

N66-15985 Field 20L
CFSTI Prices: HC$4.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
THE EFFECTS OF IRRADIATION WITH PROTONS ON THE ELECTRICAL PROPERTIES AND DEFECT CONFIGURATIONS OF THE COMPOUND B12 TE3.
Doctoral thesis.
by I. P. Chaudhari. 1965, 111p
Grant NsG-496
NASA-CR-69666

Descriptors: *Crystal structure defect, *Electric property, *Proton Irradiation, *Radiation effect, *Bismuth telluride.

N66-16179 Field 20L
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif.
FUNDAMENTAL STUDIES OF THE METALLURGICAL, ELECTRICAL, AND OPTICAL PROPERTIES OF GALLIUM PHOSPHIDE.
Quarterly Progress rept. 1 Oct - 31 Dec 65.
by G. L. Pearson. 1966, 18p
Grant NsG-555
NASA-CR-69879

Descriptors: *Electric property, *Gallium phosphide, *Metallurgy, *Optical property, *Semiconductor.

N66-16925 Field 20L
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CURRENT DISTRIBUTION IN AN ARRAY OF SUPERCONDUCTING THIN FILMS.
by A. R. Sass, J. H. Simmons, and I. D. Skurnick. Feb 66, 16p NASA-TN-D-3293

Descriptors: *Solid state device, *Thin film, *Current distribution, *Integral equation, *Superconductor.

AD-415 282 See Field 20E

AD-462 001 See Field 5A

AD-634 819 See Field 5A

AD-634 874 See Field 14B

AD-634 911 See Field 9E

AD-635 044 See Field 20F

AD-635 088 See Field 18H

AD-635 135 See Field 20B

AD-635 174 See Field 7D

AD-635 180 See Field 11F

AD-635 193 See Field 5A

AD-635 287 See Field 9A

AD-635 373 See Field 7D

AD-635 469 See Field 7D

AD-635 495 See Field 20B

20M. THERMODYNAMICS

AD-634 806 Field 20M, 20D
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
JOURNAL OF ENGINEERING PHYSICS (SELECTED ARTICLES).
18 Jan 66, 40p FTD-MT-65-182
TT-66-61580
Edited machine trans. of Inzhenerno-Fizicheskii Zhurnal (USSR) v7 n4 p44-50, 74-80, 114-20 1964.

Descriptors: (*Gases, Viscosity), (*Radiation (Heat transfer), Mathematical analysis), (*Injectors, Combustion), Gas flow, Air, Equations, USSR, Differential equations, Physics.

CONTENTS: The question of the calculation of viscosity of real gases, by A. A. Vasserman and V. A. Rabinovich; Differential methods of investigation of radiation heat transfer, by V. N. Adrianov and G. L. Polyak; General injection equation for mixers during work with variable stream parameters, by A. Ye. Yerinov and B. S. Soroka.

AD-635 192 Field 20M, 13A
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Univ., Amherst. Dept. of Chemical Engineering.
DROPWISE CONDENSATION OF STEAM AT ATMOSPHERIC AND ABOVE ATMOSPHERIC PRESSURES.
Technical rept.
by J. T. O'Bara, and E. S. Killian. 17 Mar 66, 27p
TR-1
Contract Nonr-3357 (02)

Descriptors: (*Steam, Condensation), Drops, Barometric pressure, Heat transfer, Heat transfer coefficients, Vapors, Velocity, Shear stresses.

In the first phase of this work equivalent heat transfer coefficients at atmospheric pressure for the dropwise condensation of steam were determined experimentally. The coefficients rangef from 1,140 to 37,200 BTU/hr sq ft deg F for heat fluxes of 167,000 down to 29,900 BTU/hr sq ft deg F with surface temperature differences varying from 2 to 45F. Vapor velocities varied from 1.75 to 7.52 ft/sec. It was observed that the vapor velocity across the condensing surface has a significant effect on the equivalent transfer coefficient with the coefficient exhibiting a maximum with increasing vapor velocity. It is believed that this maximum reflects the transition between dropwise and mixed condensation resulting from the greater vapor-liquid interfacial shear stress developed at high vapor velocities. Visual observations showed that, as the pressure increases, a transition from dropwise to mixed condensation occurs between 25 and 50 psig. This transition is posited to be associated with the decreased surface tension of the condensed phase at the higher saturation temperatures. (Author)

AD-635 225 Field 20M
CFSTI Prices: HC$1.50 MF$0.50
Air Force Materials Lab. Wright-Patterson AFB, Ohio.
RADIANT HEAT TRANSFER PROBLEMS RELATED TO A CRYOGENIC EMISSIVITY CALORIMETER.
Technical rept. 1 Jun-1 Dec 65.
by Emile Rutner. Apr 66, 21p AFML-TR-66-35
Proj. AF-7360
Task 736001

Descriptors: (*Calorimetry, Heat transfer), (*Heat transfer, Mathematical analysis), Absorption, Calorimeters, Thermal radiation, Radiation (Heat transfer), Emissivity, Cryogenics.

A complete derivation is given for radiant heat transfer between two parallel plates, for the case that the plate separations are not negligible, and emissivities, and absorptivities are a function of temperature. It is assumed that two plates radiating to each other are grey bodies whose emissivities, and absorptivities are a function of temperature. Thus the heat transfer equation has four optical parameters corresponding to the temperatures . (Author)

AD-635 231 Field 20M, 20D
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THERMAL ACCOMMODATION COEFFICIENT FOR AIR ON TUNGSTEN.
Master's thesis.
by Charles A. Lau. Jun 66, 76p GAM/ME/66B-14

Descriptors: (*Air, Thermal properties), (*Tungsten, Heat transfer), Superaerodynamics, Wire, Gas flow, Radiation (Heat transfer), Vacuum, Emissivity, Equations.

Identifiers: Free-molecular flow, Thermal accomodation coefficients.

The inherently difficult problem of determining thermal accommodation coefficients in air is studied. A solution, to lower the ambient temperature, is tendered. The thermal accommodation coefficient of air on a tungsten wire, 0.005 inches in diameter and 20 inches long, was investigated in the free molecule regime. The coefficient was found to decrease with an increase in temperature; at 140 F and 440 F the values of the coefficient were 0.85 and 0.20, respectively. (Author)

AD-635 297 Field 20M
CFSTI Prices: HC$3.00 MF$0.50
Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
INTENSITY FLUCTUATIONS OF THE RADIATION FROM A DISPERSIVE BLACK BODY.
Technical rept.
by R. K. Osborn, and A. Z. Akcasu. Apr 66, 30p
Rept. no. 07599-5-T
Contract DA-31-124-ARO (D)-403, ARPA Order-675
Proj. ORA-07599
AROD-6092:5

Descriptors: (*Blackbody radiation, Measurement), Statistical analysis, Photons, Detectors.

Statistical properties of the output fluctuations of a photon detector measuring the intensity of radiation at a given frequency emitted by a dispersive black body are investigated using Langevin's technique. The variance-to-mean ratio of the accumu-

lated counts, and the power spectral density of the count rate are obtained in terms of properties of the emitting medium. The possibility and limitations of obtaining information about the emitter by measuring these quantities are discussed. It is found in particular that the temperature of the emitting medium can be determined in principle by observing the intensity fluctuations of the radiation at a single frequency. The photon fluctuations in a microwave cavity are also discussed in the framework of the present formulism and compared to previous work. (Author)

AD-635 447 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
ON THE CLAUSIUS-DUHEM INEQUALITY.
Technical rept.
by Morton E. Gurtin, and William O. Williams.
Mar 66, 19p TR-7
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Inequalities, *Thermodynamics), (*Continuum mechanics, Thermodynamics).

Identifiers: Clausius-Duhem inequality.

A method of axiomatically deriving a form of the second law of thermodynamics appropriate to continuum mechanics from a general statement of the law is discussed; such a procedure logically leads to the existence of two temperatures and a modified form of the Clausius-Duhem inequality. It is then shown that for a certain class of materials the inequality can hold only if the two temperatures are always the same and thus that for such materials the usual form of the Clausius-Duhem inequality is appropriate. Finally it is shown that a simple material with memory falls into this class of materials. (Author)

N66-15309 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.75
National Bureau of Standards, Boulder, Colo.
THERMODYNAMIC PROPERTIES OF LIQUID-VAPOR PARAHYDROGEN AND LIQUID-VAPOR OXYGEN.
by R. D. Mc Carty. 17 Sep 65, 65p NBS-8883
Contract NASA Order-R-45
NASA-CR-69250

Descriptors: *Entropy, *Thermodynamic property, *Vapor pressure, *Enthalpy, *Para hydrogen.

For abstract, see T 66 16.

N66-15351 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Case Inst. of Tech., Cleveland, Ohio. Dept. of Mathematics.
ON ASSOCIATED RADIAL HEAT EXPANSIONS.
by L. R. Bragg. Sep 65, 11p Rept. no. 217
Grant NsG-544
NASA-CR-69347

Descriptors: *Heat equation, *Series expansion.

N66-15372 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif. Aerospace Sciences Lab.
EMISSIVITY COATINGS FOR LOW-TEMPERATURE SPACE RADIATORS.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 65.
by R. L. Olson, and F. J. Smith. 1965, 68p
Contract NAS3-7630
NASA-CR-54807

Descriptors: *Silicon compound, *Coating, *Spacecraft radiator.

N66-16186 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Oklahoma State Univ., Stillwater. School of Mechanical Engineering.
SPACECRAFT TEMPERATURE CONTROL BY THERMOSTATIC FINS.
Progress rept. 1 Jun - 30 Nov 65.
by D. Maples, and J. A. Wiebelt. Dec 65, 11p
Grant NsG-454
NASA-CR-69877

Descriptors: *Control surface, *Cooling fin, *Temperature control.

N66-16553 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL PRESSURE DROP INVESTIGATION OF WETTING AND NONWETTING MERCURY CONDENSING IN UNIFORMLY TAPERED TUBES.
by J. A. Albers, and H. B. Block. Feb 66, 34p
NASA-TN-D-3253

Descriptors: *Pressure drop, *Tapered column, *Turbogenerator, *Wetting.

N66-16564 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
ZERO-GRAVITY AND REDUCED-GRAVITY SIMULATION ON A MAGNETIC-COLLOID POOL-BOILING SYSTEM.
by O. C. Faber, and S. S. Papell. Feb 66, 19p
NASA-TN-D-3288

Descriptors: *Electrohydrodynamics, *Magnetic suspension, *Colloid, *Heat transfer, *Zero gravity.

N66-17045 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
WALL AND BOTTOM HEATING OF LIQUID HYDROGEN IN A PROPELLANT TANK.
by B. H. Anderson, J. W. Gauntner, and S. C. Huntley. Feb 66, 35p NASA-TN-D-3256

Descriptors: *Wall temperature, *Heat flux, *Liquid hydrogen, *Propellant tank.

AD-634 781 **See Field 20D**

AD-635 071 **See Field 21E**

AD-635 120 **See Field 8J**

AD-635 177 **See Field 20K**

AD-635 280 **See Field 13I**

BNL-980 **See Field 18J**

20N. WAVE PROPAGATION

AD-634 875 **Field 20N**
CFSTI Prices: HC$9.60 MF$0.75
Defense Research Lab., Univ. of Texas, Austin.
THE THEORY OF THE RADIATION PATTERNS OF ELECTROMAGNETIC HORNS.
Doctoral thesis,
by Claude Wendell Horton. May 48, 96p
Bumblebee-86
Contract NOrd-9195

Descriptors: (*Antenna radiation patterns, Theory), (*Horn antennas, Antenna radiation patterns), Waveguides.

Identifiers: Theses.

In this thesis an analysis is made of the radiation patterns produced by electromagnetic wave guides and horns of variously shaped cross sections. The theoretical approach is based on the concept of equivalent electric and magnetic surface currents, and it explores a method that has been suggested by S. A. Schelkunoff. No attempt is made to develop design formulae since they are adequately known from empirical data.

AD-634 974 **Field 20N, 9E**
CFSTI Prices: HC$1.00 MF$0.50
Rome Univ. (Italy). Istituto di Elettronica.
EXPERIMENTAL VERIFICATION OF THE THEORETICAL BEHAVIOUR OF SOME FERRITE STRUCTURES.
Interim Scientific rept. no. 3,
by Giorgio Gerosa, and Cesare Maria Ottavi. 22 Feb 66, 7p
Contract AF 61 (052)-807
AFCRL-66-390

Descriptors: (*Ferromagnetic materials, Wave transmission), Italy, Waveguides, Microwave equipment, Performance (Engineering), Theory, Propagation, Microwaves, Radiofrequency power, Attenuation.

Identifiers: Ferrites (Electronics).

The theoretical behaviour of some microwave ferrite structures has been experimentally verified by detecting the thermal rise produced by the dissipated r.f. power at certain characteristic regions. (Author)

AD-635 048 **Field 20N, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
MICROWAVE PORTION OF THE OXYGEN LINES REFRACTOMETER.
Final rept.
by Raymond J. Snay. Jun 66, 41p MTR-18
Contract AF 19 (628)-5165
Proj. AF-705A
ESD-TR-66-65

Descriptors: (*Refractometers, *Microwave equipment), Atmospheric refraction, Refractive index, Radio transmission, Extremely high frequency, Phase shift, Radar equipment, New Hampshire.

A microwave subsystem was installed in The MITRE Corporation's refractometer vans as an integral part of the oxygen-lines refractometer. In operation, two coherent frequencies, 45 and 90 Gc, are transmitted along a 23-km path, and the change in differential phase shift is measured at the receiver. This change is an indication of the refractive qualities of the atmosphere over the path. The equipment was tested at a field site in the Lake Winnepesaukee, New Hampshire, region; test results and recommendations for improving system sensitivity and stability are given. (Author)

AD-635 186 **Field 20N, 20A**
CFSTI Prices: HC$7.00 MF$1.50
Michigan Univ., Ann Arbor. Radiation Lab.
STUDIES IN RADAR CROSS SECTIONS L - DIFFRACTION AND SCATTERING BY REGULAR BODIES IV: THE CIRCULAR CYLINDER.
by Olov Einarsson, Ralph E. Kleinman, Pushpamala Laurin, and Piergiorgio L. E. Uslenghi. Feb 66, 330p Rept. no. 7133-3-T, Scientific-3
Contract AF 19 (628)-4328
Proj. AF-5635
Task 563502
AFCRL-66-182
See also AD-623 852.

Descriptors: (*Electromagnetic waves, Scattering), (*Mechanical waves, Scattering), (*Cylindrical bodies, Wave transmission), Optics, Acoustics, Electromagnetic wave reflections, Radar echo areas, Diffraction, Boundary value problems.

A survey of electromagnetic and acoustical scattering by a circular cylinder is performed. Theoret-

ical methods and results for infinite and semi-infinite cylinders, and experimental ones for finite cylinders, are included. Only time-harmonic fields are considered, and dielectric cylinders are not taken into account. (Author)

AD-635 212 **Field 20N**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
MODAL SOLUTION OF A POINT SOURCE IN A STRONGLY FOCUSING MEDIUM.
by Arthur D. Yaghjian, and Edward T. Kornhauser.Jun 66, 32p Scientific-2, AF-5846/2
Contract AF 19 (628)-5846
Proj. AF-5635
Task 563503
AFCRL-66-403

Descriptors: (*Ionospheric propagation, *Plasma medium), (*Field theory, *Green's function), Mathematical analysis.

For abstract, see T 66 16.

AD-635 273 **Field 20N**
CFSTI Prices: HC$6.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
DETERMINATION OF PROPAGATION OF SHORT-WAVE SIGNALS BY THE CHARACTERISTIC DISTORTIONS AT THE POINT OF RECEPTION.
by N. A. Telpukhovskii. 16 Feb 66, 19p FTD-MT-65-166
TT-66-61685
Edited machine trans. of mono. Glavnaya Astronomicheskaya Observatoriya (Pulkovo). Trudy. 15-y Astometricheskoi Konferentsii SSSR, Moscow/Leningrad, 1963 p365-73.

Descriptors: (*Radio signals, Propagation), Radio reception, Radio interference, Determination, USSR.

The possibility of determining the propagation time of shortwave station signals by means of characteristic distortions at the reception point is considered. The distortions are due to the summation of signals, which travelled paths of different length, at the reception point. The comparison of the method of determination of propagation time from measurements of the propagation time differences of separate signals with that of two-sided measurements showed satisfactory agreement. In order to facilitate such measurements it is proposed that short (0.1-0.2 msec) impulses be included in the signal transmission program. It is shown that Stoyko's empirical formulas for the computation of propagation time give too high values if the signals are registered by the oscillographic method. (Author)

AD-635 380 **Field 20N, 4A**
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
ON THE RELATION OF IONOSPHERIC DOPPLER SHIFT, PHASE VELOCITY, AND INTEGRATED ELECTRON CONTENT.
Technical rept.
by P. R. Arendt. Jun 66, 34p ECOM-2724
Task DA-1P0-14501-B31A-38

Descriptors: (*Ionospheric propagation, Radio waves), (*Satellite tracking systems, Doppler systems), Radio transmission, Doppler effect, Electron density, Ionosphere, Astronomical geodesics.

Difficulties are discussed which are inherent with unlimited use of the Differential Doppler method for satellite measurements. For precision, restriction is recommended to overhead passages and to closely related frequencies. The restriction applies to measurements of the ionospheric electron content, finding of geodetic positions, and to hybrid methods combining polarization and frequency measurements. (Author)

AD-635 534 **Field 20N, 20C, 9A**
CFSTI Prices: HC$2.00 MF$0.50
Radiation, Inc., Melbourne, Fla.
ON THE STORED ENERGY OF PLANAR APERTURES.
by Donald E. Rhodes. 20 May 66, 28p Scientific-3
Contract AF 19 (628)-4007
Proj. AF-4600
Task 460010
AFCRL-66-407

Descriptors: (*Antenna apertures, *Electromagnetism), Antenna radiation patterns, Numerical analysis, Algorithms.

Identifiers: Planar apertures, Poynting theorem, Planar antennas.

The volume integrals in the complex Poynting theorem are usually assumed to represent stored magnetic and electric energy. But for a planar aperture radiating into a lossless homogeneous medium it is shown that the only physically observable part of the volume integrals is twice that produced in the invisible region of the pattern space factor by those field components that vanish in the plane outside of the aperture. The new formulas for stored magnetic and electric energy of planar apertures are used to make the first known test of the widely held assumption that the reciprocal relationship between Q and band-width of non-radiating systems applies also to radiating systems. By direct computation of Q and of bandwidth independently it is shown that the reciprocal relationship does hold for the test case treated (the planar dipole). (Author)

AD-427 062 **See Field 20I**

AD-444 792 **See Field 20I**

AD-634 792 **See Field 9E**

AD-634 910 **See Field 4A**

21B. COMBUSTION AND IGNITION

AD-634 867 **Field 21B, 7D**
CFSTI Prices: HC$6.60 MF$0.75
Johns Hopkins Univ., Silver Spring Md. Applied Physics Lab.
A SUMMARY OF THE STATUS OF RESEARCH ON THE MECHANISM OF COMBUSTION.
Oct 46, 65p Bumblebee-47
Contract NOrd-7386
Subcontracted to Arthur D. Little, Incorporated, Cambridge, Mass.

Descriptors: (*Combustion, State-of-the-art reviews), Reaction kinetics, Jet propulsion, Rocket propulsion, Oxidation, Explosions, Flame propagation, Stability, Catalysts, Hydrocarbons, Thermodynamics.

The purpose of the report is 'to provide a survey of information available on chemical reactions which may be of interest for rocket and ram-jet propulsion systems; information is particularly desired on studies leading to the elucidation of mechanisms of gas-phase oxidation reactions, including investigations of the initiation of reaction, explosion limits, flame propagation and stability, nature of reaction intermediates, and of accelerating and inhibiting agents.'

AD-634 873 **Field 21B**
CFSTI Prices: HC$8.60 MF$0.75
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
FLAME PROPAGATION: CRITICAL REVIEW OF EXISTING THEORIES.
by George H. Markstein, and Michael L. Polanyi. Jun 47, 89p Bumblebee-61
Contract NOrd-8993

Descriptors: (*Flame propagation, Reviews), Transformations, Fluid dynamic properties, Velocity, Kinetic theory, Reaction kinetics.

The theory of flame propagation was subdivided into two groups of problems: (a) study of the transformation velocity, and (b) hydrodynamical aspects of flame propagation. (Author)

AD-635 159 **Field 21B, 7D, 19D**
CFSTI Prices: HC$1.50 MF$1.00
Princeton Univ., N. J. Dept. of Chemical Engineering.
KINETICS OF THE BRANCHING STEP IN THE REACTION OF HYDROGEN WITH OXYGEN.
Doctoral thesis.
by Shelby Clarke Kurzius. Dec 64, 146p
Contract AF 49 (638)-32
oj. AF-9751
Task 975101
AFOSR-66-1311

Descriptors: (*Flames, Reaction kinetics), (*Hydrogen, Reaction kinetics), (*Oxygen, Reaction kinetics), Deuterium, Heat of activation, Theory, Explosions, Diffusion, Chemical equilibrium.

Identifiers: Chain reactions (Chemical).

Lower explosion limits in hydrogen-oxygen and deuterium-oxygen mixtures were measured in the diffusion regime. From the data, the rate constants for the reaction H + O2 to OH + O and its isotope effect were calculated between 800 and 1000K. A theory is presented for reactions of essentially zero activation energy which, when applied to the above reaction and its reverse, leads to a rate constant expression which is a hybrid between that of the absolute rate theory and that of the classical collision theory of reactions. Subsidiary observations and theory related to the kinetics of the branching reaction and its elucidation by the method of explosion limits are reported. These include: (1) the concept of chain branching efficiencies; contributions to the theory of explosion limits; observations and the explanation of very long induction times in the vicinity of the lower explosion limit in the diffusion regime; observations on the kinetics of the reaction H + O2 + M to HO2 + M and its isotope effect with deuterium; similar observations for the reaction O + H2 to OH + H; and observations on the elusive subject of chain initiation, which indicate that the initiation process is heterogeneous at the low pressure of these experiments. (Author)

AD-635 161 **Field 21B, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Astrosystems International, Inc., Fairfield, N. J.
COMBUSTION GAS EMITTED RADIATION AND CHEMILUMINESCENCE PHENOMENA.
Annual technical status rept. 15 Apr 65-15 Apr 66.
by John S. Gordon. 15 May 66, 52p TR-64002-F2
Contract AF 49 (638)-1400
Proj. AF-9750
Task 975002
AFOSR-66-1366

Descriptors: (*Flames, Spectroscopy), (*Combustion gases, Spectroscopy), (*Chemiluminescence, Combustion gases), Emissivity, Band spectrum, Reaction kinetics, Oxidizers, Oxygen, Nitrogen compounds, Oxides, Perchloryl radicals, Fluorides, Fuels, Methane, Ethylenes, Alkynes, Hydrogen compounds, Sulfides, Carbon monoxide.

Identifiers: Hydrogen sulfide, Nitrogen oxides, Perchloryl fluoride.

The study was concerned with spectra of premix flames and combustion gases at low pressure, with applications to chemiluminescence, kinetic and reaction mechanism elucidation. Oxidizers were O2, NO, N2O, ClO3F; fuels were CH4, C2H4,

C2H2 and H2S. Spectral scans coupled with thermochemical analyses indicated several bimolecular reaction mechanisms forming excited species at low pressure with characteristic signatures: CH + N to CN* + H; N + O to NO (doublet-piP to NO*); CH + CH to C2* + H2; C + HO2 to CO* + OH; CH + SH to CS* + H2; CCl + OH to CO* + HCl; C2 + ClO to CCl* + CO. Several previously unreported CO bands (4th positive system) with v' = 0,1,2, and 3 were observed. In addition, emission from NH, OH, SO, S2, CH and CH (+) were seen. (Author)

AD-635 302 **Field 21B**
CFSTI Prices: HC$1.00 MF$0.50
Royal Norwegian Air Force, Oslo. Inst. of Aviation Medicine.
EFFECT OF VARYING PERCENTAGES AND PARTIAL PRESSURES OF OXYGEN ON FLAME SIZE.
by F. Vogt Lorentzen. Dec 65, 6p Rept. no. 65-4

Descriptors: (*Flames, Oxygen), Physical properties, Pressure, Analysis of variance, Tests, Carbon monoxide, Hypoxia, Carbon dioxide, Combustion, Norway.

The match test (or candle flame) tells whether the O2 percent is low, before a person experiences any symptoms whatever of hypoxia. The test gives no direct information about CO or CO2. There may be lethal concentrations of carbon monoxide in the air although the match test is normal. (1 % CO caused no change in the flame in some experiments.) In the case of CO2, such high concentrations are needed to influence the flame that other effects on the individual would be apparent first. In heating appliances where the fuel and air supply are regulated, however, soot and CO formation will occur more easily when the O2 percentage is low. Even at high altitudes, air crews should not presume that high percentages of oxygen are less dangerous in case of fire. (Author)

N66-16049 **Field 21B**
CFSTI Prices: HC$3.00 MF$0.50
Stevens Inst. of Tech., Hoboken, N. J. Dept. of Mechanical Engineering.
SURFACE EFFECTS OF FLAME SPREADING OVER IGNITING COMPOSITE SOLID PROPELLANTS CONSTITUENTS.
by F. A. Horowitz, S. Y. Lee, and R. F. Mc Alevy III. Jun 65, 57p MR-RT-65005
Grant NGR-31-003-014
NASA-CR-69695

Descriptors: *Composite propellant, *Flame, *Ignition system, *Solid propellant ignition.

For abstract, see T 66 16.

AD-634 778 **See Field 21E**

AD-635 188 **See Field 21I**

AD-635 274 **See Field 19D**

21C. ELECTRIC PROPULSION

N66-15320 **Field 21C**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A CRITICAL DISCUSSION ON THE PLANNING CONSIDERATIONS OF ELECTRIC PROPULSION FOR SPACE MISSIONS.
by J. W. Stearns. 1964, 32p
NASA-CR-60750
Presented at the AIAA Bien. Aerospace Power Systems Conf. (3rd), Philadelphia, Sep 1-4 1964.

Descriptors: *Booster, *Electric propulsion, *Nuclear rocket, *Saturn V launch vehicle, *Space mission.

N66-16038 **Field 21C**
CFSTI Prices: HC$4.00 MF$0.75
General Electric Co., Philadelphia, Pa. Missile and Space Div.
PERFORMANCE STUDY OF A REPETITIVELY PULSED TWO-STAGE PLASMA PROPULSION ENGINE.
Final rept.
by P. Gloersen, B. Gorowitz, and J. H. Rowe. 20 Nov 63, 113p
Contract NAS3-2502
NASA-CR-55248

Descriptors: *Two-stage plasma engine, *Plasma propulsion, *Propulsion system performance.

N66-18020 **Field 21C**
CFSTI Prices: HC$5.00 MF$1.00
General Electric Co., Philadelphia, Pa. Missile and Space Div.
INVESTIGATION OF PLASMA ACCELERATOR (CYCLOTRON RESONANCE PROPULSION SYSTEM).
Final rept.
by G. W. Bethke, G. F. Crimi, and D. B. Miller. 1 Nov 65, 177p GE-214-252 (Final)
Contract NAS3-6266
NASACR-54746

Descriptors: *Cyclotron resonance, *Plasma propulsion, *Electron accelerator, *Plasma accelerator.

21D. FUELS

AD-634 778 **See Field 21E**

AD-634 815 **See Field 21E**

PB-170 490 **See Field 13B**

21E. JET AND GAS TURBINE ENGINES

AD-634 778 **Field 21E, 21B, 21D**
CFSTI Prices: HC$2.00 MF$0.50
Texaco Experiment, Inc., Richmond, Va.
CORRELATION OF CLASSICAL COMBUSTION QUANTITIES WITH RAMJET BURNER PERFORMANCE.
by H. F. Calcote, J. B. Fenn, and J. W. Mullen II. May 50, 39p Bumblebee-130
Contract NOrd-9756

Descriptors: (*Ramjet engines, *Combustion), Performance (Engineering), Jet engine fuels, Effectiveness, Fuel additives, Spark ignition, Flame propagation.

Identifiers: Bumblebee project.

An attempt was made to correlate each of four combustion quantities (hot rod ignition parameter, normal flame velocity, lean inflammability limits, and minimum spark ignition energy) with ramjet burner performance in respect to effect of fuel type on efficiency, effect of fuel additives on efficiency, burner stability limits, and efficiency losses at altitudes. It was found that all of the measured combustion quantities have a definite relation to the first three burner performance characteristics. Although no hot rod work was done at altitude, the second and third combustion quantities do not give practical predictions of the efficiency losses to be expected at lower pressures. Minimum spark ignition energy, however, does serve this purpose. The most interesting point originating from these correlation studies is the development of a single curve for a given burner, which predicts efficiency in terms of minimum spark ignition energy over a wide range of simultaneous variation in pressure and fuel type. (Author)

AD-634 815 **Field 21E, 21D**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
PATHS OF DEVELOPMENT OF STATIONARY GAS TURBINE ENGINES IN USSR. USE OF PETROLEUM FUEL AND DISSOLVED ADDITIVES FOR LOWERING VANADIUM CORROSION IN GAS TURBINE ENGINES.
by G. I. Shuvalov, G. G. Olkhovskii, and R. A. Lipshtein. Jun 66, 22p FSTC-HT-23-122-66
Proj. 2301-6553
TT-66-61589
Trans of Teploenergetika (USSR) n9 p2-6, 19-21 1964.

Descriptors: (*Gas turbines, Production), (*Fuels, Corrosion inhibition), (*Corrosion inhibition, Gas turbines), (*Fuel additives, Corrosion inhibition), (*Vanadium, Corrosion), Petroleum, USSR.

The first article surveys the results of experimental development of Soviet gas turbine engines and ways of using them in power engineering. Detailed tables are given showing characteristics of various engines. The second article considers the question of choice of additives to sulfurous petroleum fuel permitting the avoidance of appreciable vanadium corrosion during the operation of the gas turbine engines. (Author)

AD-634 816 **Field 21E**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
QUESTION OF THE ELASTIC AND PLASTIC STRESS CONDITION OF BLADES UNDER THERMAL SHOCK. INVESTIGATION OF THERMAL FATIGUE OF BLADES AND DISKS OF CENTRIPETAL GAS TURBINES. NATURAL TESTING OF THE WORKING WHEEL OF A CENTRIPETAL GAS TURBINE UNDER CONDITIONS OF REPEATED STARTS.
Jun 66, 22p FSTC-HT-23-121-66
Proj. 2301-6553
TT-66-61590
Trans. of Teplovve Napryazheniya v Elementakh Turbomashin (USSR) v4 p250-5, 287-97, 298-301.

Descriptors: (*Gas turbine blades, *Stresses), (*Turbine wheels, Fracture (Mechanics)), USSR, Fatigue (Mechanics), Thermal stresses, Gas turbines, Compressors, Strain (Mechanics), Performance (Engineering), Turbine parts.

Three reports are included: (1) investigation of elastic-plastic stressed state of a guide blade at various operating regimes of a gas turbine; six equations are developed; values are given for relative strain in separate points; (2) study of thermal fatigue of blades and disks of centripetal gas turbines, clarifying the general problem of cracks in working wheels of the CGT; and (3) natural testing of a CGT working wheel under repeated starting conditions (nonstationary conditions); actual tests were made with turbine on stand, and operating of combustion chamber gases. Before and at intervals during the tests, the turbocompressor was dismantled and the wheel was visually inspected for cracks. The tests showed that the fractures in various wheels are associated with thermal fatigue. (Author)

AD-634 977 **Field 21E, 14B**
CFSTI Prices: HC$6.60 MF$0.75
New Mexico State Univ., University Park. Physical Sciences Lab.
THE MEASUREMENT OF FUEL FLOW.
by C. Donald Crosno, and James S. Arnold. Sep 61, 61p Bumblebee-161
Contract NOrd-9939

Descriptors: (*Jet engine fuels, Fluid flow), (*Flowmeters, Fuels), (*Fuels, Fluid flow), Turbines, Electromagnetic fields, Hydrocarbons.

Contents: the turbine flowmeter; The electromagnetic flowmeter; Conduction in hydrocarbon fuels; Laboratory use of the electromagnetic flowmeter.

AD-635 071 **Field 21E, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
DETERMINING THE TEMPERATURE FIELD OF TURBINE BLADES WITH LONGITUDINAL AIR COOLING ON THE BASIS OF ASYMPTOTIC METHODS OF ANALYSIS.
ATD work assignment no. 76,
by I. S. Lyubchenko. 11 May 66, 15p ATD-66-TT-61657

Opredelenie Temperaturnogo Polya Turbinnikh Lopatok s Prodolnym Vozdushnym Okhlazhdeniem na Osnove Asimptoticheskikh Metodov Analiza, trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Aviatsionnaya Tekhnika (USSR) n3 p98-107 1965.

Descriptors: (*Turbine blades, *Temperature), Gas turbines, Air cooled, Determination, Asymptotic series, USSR.

After citing several sources given different methods for calculating the temperature condition of a gas turbine rotor blade, the author concludes that, on the whole, the problem of temperature distribution along the rotor blade height, considering the variation of all factors entering into the system of differential equations describing the phenomenon of heat-exchange, remained unsolved. In the present paper, according to the author, the given problem is approximately solved using asymptotic methods for the most general case, whereby the error of actual relationships of the quantities entering into the system of equations does not exceed 1--3%.

AD-635 230 **Field 21E, 20D**
CFSTI Prices: HC$1.50 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF THE MIXING OF PERPENDICULAR GAS JETS AS APPLIED TO SUPERSONIC COMBUSTION.
Master's thesis.
by Stephen P. Condon. Jun 66, 83p GAM/ME/66B-11

Descriptors: (*Combustion, *Jet mixing flow), (*Ramjet engines, Supersonic flow), Helium, Two-dimensional flow, Air, Schlieren photography, Flow visualization, Sound, Injection, Turbulence.

Identifiers: Scramjets.

An experimental investigation of the turbulent mixing of subsonic, sonic, and supersonic jets of helium discharging transversely into a supersonic jet of air was made using a two-dimensional mixing chamber. The investigation has a potential application in the field of the supersonic combustion ramjet engine. The Mach numbers of the helium jets were 0.75, 1.0, and 1.5, respectively, and the Mach number of the air jet was 1.5. Both the helium and air jets had stagnation temperatures of approximately 76F. The effects of combustion on the mixing were not considered. Volumetric concentration values and total pressure values were obtained at points in the mixing region, and helium volumetric concentration profiles were plotted. Schlieren photography was used to obtain a visualization of the flow structure. Sonic injection was found to be the most desirable method of injection due to depth of penetration and total pressure considerations. (Author)

AD-635 255 **Field 21E, 20D**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TWO-DIMENSIONAL JET MIXING IN A SUPERSONIC FLOW.
Master's thesis.
by Donald Edwin Johnson. Apr 66, 80p GAM/ME/66B-12

Descriptors: (*Jet mixing flow, Combustion), (*Ramjet engines, Jet mixing flow), Two-dimensional flow, Supersonic flow, Injection, Density, Distribution, Helium, Interferometers.

Identifiers: Scramjets.

The two-dimensional turbulent mixing region, resulting when a near sonic helium jet impinges at 30, 45 or 60 degrees on a supersonic air stream, was experimentally investigated utilizing an interferometer, a gas analyzer, and a total pressure rake. This type of mixing has a possible application in the supersonic combustion ramjet engine. Volumetric concentration profiles and a total pressure map of the mixing region were obtained for each injection angle. The mixing obtained for each injection angle was compared with that obtained with other injection systems. The techniques used for spark lamp photography are discussed. It was concluded that the interferometer cannot be focused so that fringes can be obtained throughout the mixing region at one interferometer setting. Many photographs at different interferometer settings would be required to determine the density distribution in the mixing region for gases having an extreme density difference. (Author)

AD-634 943 **See Field 1C**

AD-634 944 **See Field 1C**

AD-634 945 **See Field 1C**

AD-634 946 **See Field 1C**

AD-634 947 **See Field 1C**

AD-634 948 **See Field 1C**

AD-634 949 **See Field 1C**

AD-634 950 **See Field 1C**

AD-635 106 **See Field 1C**

AD-635 280 **See Field 13I**

AD-635 496 **See Field 10B**

21F. NUCLEAR PROPULSION

AD-635 232 **See Field 18K**

AGN-8135 **See Field 18B**

21H. ROCKET MOTORS AND ENGINES

AD-634 986 **Field 21H, 21I**
CFSTI Prices: HC$2.00 MF$0.50
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
NON-STEADY COMBUSTION OF SOLID PROPELLANTS WITH SPECIAL REFERENCE TO ROCKET INSTABILITY.
Annual technical rept., 1 Oct 64-30 Sep 65.
by Herman Krier, Gerald di Lauro, Lubomyr Kurylko, and Martin Summerfield. Mar 66, 38p Aerospace/Mechanical Sci-773
Contract AF 49 (638)-1405
Proj. AF-9713
Task 971301
AFOSR-66-1099

Descriptors: (*Solid rocket propellants, *Combustion), (*Rocket motors (Solid propellant), Stability), Rocket motor nozzles, Pressure, Combustion chambers, Entropy, Flames, Brightness, Emissivity.

A prominent mode of coupling that may drive a solid propellant rocket motor into instability is the interaction between the oscillatory gas dynamic pressure at the burning surface and the instantaneous rate of the oscillatory combustion process. The effects on the solid propellant flame pressure fluctuations and of rapid monotonic pressure increases are being investigated in a continuing program. Two pieces of apparatus are in use for this purpose. One is the T-tube oscillator. The second is a new combustor designed to produce rapid monotonThe latter is a chamber with a device to change suddenly on command the throat area of the nozzle to produce pressure rise times of 8,000 psi per second and less. This low range supplements the higher range achievable in the T-tube oscillator. The chamber has three quartz windows which allow luminosity measurements and high speed motion pictures of the propellant flame to be made along with chamber pressure. By varying the chamber volume, and thereby the dp/dt, luminosity versus pressure can be obtained as a function of dp/dt. From this, the temperature is plotted as a function of pressure and dp/dt, and therefore the entropy is plotted as a function of the same variables. The brightness-emissivity method of instantaneous flame temperature measurement is being used. Experiments are being conducted to determine the flame temperature as a function of pressure in various regimes of dp/dt. (Author)

N66-15337 **Field 21H**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN EXPERIMENTAL CORRELATION OF THE NONREACTIVE PROPERTIES OF INJECTION SCHEMES AND COMBUSTION EFFECTS IN A LIQUID-PROPELLANT ROCKET ENGINE. PART VI. THE RELATION BETWEEN THE STARTING TRANSIENT AND INJECTION HYDRAULICS.
by R. M. Clayton, and J. H. Rupe. 29 Oct 65, 29p JPL-TR-32-255
Contract NAS7-100
NASA-CR-69251

Descriptors: *Combustion stability, *Feed system, *Liquid propellant, *Propellant transfer, *Fuel injection, *Gas pressure.

For abstract, see T 66 16.

N66-16390 **Field 21H**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
GENERANT CONTROLLER DEVELOPMENT FOR THE ADVANCED LIQUID PROPULSION SYSTEM (ALPS).
by W. F. Mac Glashan Jr. 15 Nov 65, 39p JPL-TR-32-814
Contract NAS7-100
NASA-CR-69819

Descriptors: *Flow regulator, *Gas generator, *Hydrazine, *Liuqid propellant.

N66-16547 **Field 21H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
VORTEX FLOW AND EROSION IN ROCKET NOZZLES DUE TO WARM-GAS INJECTION FOR THRUST VECTOR CONTROL.
by G. L. Smith. Feb 66, 25p NASA-TN-D-3241

Descriptors: *Thrust vector control, *Gas injection, *Rocket nozzle.

N66-16571 **Field 21H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
STATIC AND DYNAMIC CHARACTERISTICS OF CENTAUR GIMBAL SYSTEM UNDER THRUST LOAD.
by R. J. Antl, L. D. Plews, and D. W. Vincent. Feb 66, 24p NASA-TM-X-1205

Descriptors: *Centaur launch vehicle, *Dynamic property, *Thrust loading, *Gimballed control, *Static testing.

N66-16938 **Field 21H**
CFSTI Prices: HC$4.00 MF$0.75
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
EXPERIMENTAL AND ANALYTICAL STUDIES OF CRYOGENIC PROPELLANT TANK PRESSURANT REQUIREMENTS.
by M. E. Nein, and J. F. Thompson. Feb 66, 111p NASA-TN-D-3177

Descriptors: *Cryogenic storage, *Liquid propellant, *Propellant tank.

N66-16941 **Field 21H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
COLD-AIR PERFORMANCE EVALUATION OF SCALE MODEL OXIDIZER PUMP-DRIVE TURBINE FOR THE M-1 HYDROGEN-OXYGEN ROCKET ENGINE. I. INLET FEEDPIPE-MANIFOLD ASSEMBLY.
by D. G. Evans, R. J. Roelke, and R. G. Stabe. Feb 66, 33p NASA-TN-D-3294

Descriptors: *Turbine nozzle, *Cold flow test, *M-1 rocket engine, *Turbopump, *Two-stage turbine.

21I. ROCKET PROPELLANTS

AD-466 040 **Field 21I, 20K, 11J**
CFSTI Prices: HC$9.60 MF$0.75
Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
DETERMINATION OF THE COMPLEX SHEAR MODULUS OF A FILLED ELASTOMER FROM A VIBRATING SANDWICH BEAM,
by T. Nicholas, and R. A. Heller. Jun 65, 96p
Technical rept. TR-30
Contract Nonr-266 (78)
Proj. NR-064-446

Descriptors: (*Solid rocket propellants, Shear stresses), (*Elastomers, Shear stresses), (*Shear stresses, Test methods), (*Sandwich construction, Vibration), Viscoelasticity, Steel, Beams (Structural), Mathematical analysis, Isocyanate plastics, Potassium compounds, Chlorides, Solid rocket propellant binders.

Identifiers: Potassium chloride.

A technique for determining the complex shear modulus of a linear viscoelastic material from damped free vibrations of sandwich beams is presented. The sandwich beams consist of thin steel facings and cores of a filled elastomer. In such construction the facing experiences only extensional vibrations and the core only shear when the difference in stiffness between core and facing is large. The mathematical analysis of such a system involves, in general, two complex moduli of the core. However, the relative rigidity of the facings allows the elimination of the complex Young's modulus from the equations, thereby leading to a direct evaluation of the complex shear modulus. Experimental results for a wide range of temperatures and frequencies are presented for a potassium chloride filled polyurethane solid propellant. With the aid of an Arhenius type temperature-time shift function the shear modulus and damping constant are evaluated over eight decades of frequency. (Author)

AD-635 188 **Field 21I, 21B**
CFSTI Prices: HC$1.50 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
MEASUREMENT OF TEMPERATURE PROFILES IN BURNING SOLID PROPELLANT.
Memorandum rept.
by Richard C. Strittmater, H. E. Holmes, and L. A.Watermeier. Mar 66, 24p BRL-MR-1737
Proj. RDT/E-1C222901A211

Descriptors: (*Solid rocket propellants, Temperature), (*Combustion, Solid propellants), Photographic analysis, Thermocouples, Bipropellants, High-speed photography, Test methods.

A technique is presented for synchronizing a high speed motion picture record of a small thermocouple emerging from a burning surface with the temperature record from the thermocouple. Experimental results are presented which show the burning surface temperature of M13 double base propellant to be 535C at 200 psig. A heat loss analysis is presented which indicates that the thermocouples used in this study, and in fact, all thermocouples used in temperature profile measurement in burning solid propellants have given temperatures much too low. Suggestions are made for measurement technique which would yield more accurate results. (Author)

AD-634 986 **See Field 21H**

AD-635 296 **See Field 7D**

22A. ASTRONAUTICS

AD-463 208 **Field 22A, 14B**
CFSTI Price: HC$6.00
Royal Aircraft Establishment, Farnborough (England).
AN INTRODUCTION TO ZERO-g RESEARCH AT THE ROYAL AIRCRAFT ESTABLISHMENT.
Technical rept.
by J. Porter. Feb 65, 27p TR-65016

Descriptors: (*Weightlessness, Simulation), Spacecraft components, Fuel tanks, Astronautics, Test facilities, Great Britain.

Discussion shows the importance of the zero-g environment of an orbiting satellite as a factor in the design of two phase liquid-vapour systems. The possible way in which zero-g may be simulated are discussed, leading to a description of the facilities devised and used at the Royal Aircraft Establishment. The application of these facilities in the design of a satellite fuel tank is also considered. (Author)

AD-634 931 **Field 22A**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
THE FLIGHT OF AUTOMATIC INTERPLANETARY STATIONS 'VENUS-2' AND 'VENUS-3'.
May 66, 16p ACIC-TC-1033
TT-66-61646
Opolete Avtomaticheskikh Mexhplanetnykh Stantsii 'Venera-2' i 'Venera-3', trans from Ekonomicheskaya Gazeta (USSR) n10 1966.

Descriptors: (*Space stations, *Venus probes), Interplanetary trajectories, Planetary atmospheres, Spacecraft components, Automatic, Venus (Planet), USSR.

For abstract, see T 66 16.

N66-15807 **Field 22A**
CFSTI Prices: HC$4.00 MF$1.00
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
CRITICAL MEASUREMENTS ON EARLY MISSIONS TO JUPITER.
by M. W. P. Cann, J. M. Witting, and T. C. Owen. Dec 65, 127p
Contract NASr-65 (06)
NASA-CR-69561

Descriptors: *Jupiter/planet/, *Magnetosphere, *Flyby mission, *Planetary atmosphere.

N66-16388 **Field 22A**
CFSTI Prices: HC$2.00 MF$0.50
Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
LUNAR NAVIGATION STUDY, SUMMARY VOLUME.
Final rept. Jun 64-May 65.
by L. J. Abbeduto, M. E. Amdursky, D. K. Breseke, J. T. Broadbent, and R. A. Gill. Jun 65, 50p
BSR-1134-Summ-Vol
Contract NAS8-11292
NASA-CR-69860

Descriptors: *Component reliability, *Lunar surface, *Navigation system, *Navigation ;UIDANCE.

AD-481 079 **See Field 22C**

AD-635 196 **See Field 6K**

AD-635 204 **See Field 6R**

AD-635 206 **See Field 6Q**

22B. SPACECRAFT

AD-490 833 **Field 22B, 11G**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
MATERIALS FOR SPACE FLIGHT.
by George A. Hoffman. 1 Jul 58, 29p P-1420
Presented at the IAS-ARS Space Exploration Meeting at San Diego, Calif., 5-6 Aug 58.

Descriptors: (*Spacecraft, Materials), (*Heat-resistant materials, Spacecraft), Thermal properties, Weight, Refractory materials, Carbon, Carbides, Fibers, Whiskers (Crystals), Beryllium, Tensile properties, Buckling (Mechanics), Performance (Engineering).

The paper discusses the spectrum of thermal environments and functional requirements for materials used in space vehicles. Two major criteria emerge: (1) a desire by designers to operate materials at the highest permissible temperature and (2) the necessity to minimize the structural weight. Future possibilities in materials are investigated in these categories: For maximum temperatures the metals, carbon and carbides are studied, while for minimum weight requirements fibered materials - for tension elements - and beryllium, - for buckling components - are discussed. Improvements in performance of space flight vehicles are listed, as afforded by the advanced materials studied. Topics for research in each material area are offered. (Author)

AD-634 866 **Field 22B, 4A**
CFSTI Prices: HC$17.20 MF$1.00
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
AEROBEE HIGH ALTITUDE SOUNDING IGN, CONSTRUCTION AND USE,
by L. W. Fraser. Dec 48, 176p Bumblebee-95
tract NOrd-7386

Descriptors: (*Sounding rockets, Design), (*Atmospheric sounding, Sounding rockets), Upper atmosphere, High altitude, Probes, Telemeter systems, Rockets, Ground support equipment, Specifications.

Identifiers: Aerobee.

Contents: General description of the Aerobee and launcher; Sustaining motor and components of the rocket and booster; Preparation of the missile for launching; Range safety considerations; Radio command fuel cutoff system; The Aerobee rocket as a high altitude research vehicle; Recording and recovery of scientific data obtained on Aerobee flights; Power supply; Instrumentation mounting; Instrumentation; Measurement of aspect of the rocket; Telemetering; Summary of API. Aerobee flights.

AD-635 383 **Field 22B**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FEASIBILITY STUDY OF AN EXPANDABLE SPACE MAINTENANCE HANGAR.
Master's thesis.
by Michael Roy Keating. Mar 66, 123p GAM/MC/66A-3

Descriptors: (*Hangars, *Space maintenance), Expandable structures, Feasibility studies, Polyester plastics, Glass textiles, Isocyanate plastics, Expanded plastics, Dacron, Polyvinyl chloride.

To determine the feasibility of an expandable space hangar, a composite wall using polyester terephthalate, 181 style glass cloth, polyurethane foam, and polyvinylidene chloride is designed to operate in a 500 kilometer circular orbit. The structure is cylindrical with hemispherical ends and has a length of 65 feet and a diameter of 25 feet. The wall affords occupants protection form radiation and meteoroids, has a low gas permeability, withstands an internal pressure of 7.5 lb/sq. in., and can be compressed into a launch package of 460 cu. ft. It is concluded that a design of an expandable space hangar is feasible. (Author)

N66-15813 **Field 22B**
CFSTI Prices: HC$7.00 MF$2.00
General Electric Co., Philadelphia, Pa. Missile and Space Div.
VOYAGER SPACECRAFT SYSTEM STUDY. PHASE II. SATURN V LAUNCH VEHICLE, VOLUME I IA.
Final rept.
9 Dec 64, 377p Rept. no. 64SD4376
Contract NAS7-100
NASA-CR-69566

Descriptors: *Radiation shielding, *Voyager project, *Landing module, *Mars probe, *Payload, *Systems analysis.

For abstract, see T 66 16.

N66-15824 **Field 22B**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Philadelphia, Pa. Missile and Space Div.
VOYAGER SPACECRAFT SYSTEM STUDY. PHASE II. SATURN V LAUNCH VEHICLE. VOLUME I. SUMMARY.
Final rept.
9 Dec 64, 80p Rept. no. 64SD4376
Contract NAS7-100
NASA-CR-69578

Descriptors: *Mars (Planet), *Voyager project, *Saturn V Launch vehicle, *Unmanned spacecraft.

N66-16081 **Field 22B**
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Missiles and Space Co., Sunnyvale, Calif.
MANUFACTURING CHECKOUT OF ORBITAL OPERATIONAL STAGES.
Midterm rept. 24 Feb 65.
by R. A. Blais, F. L. Day, L. L. Haas, and W. T. Scarborough. 12 Apr 65, 139p LMSC-A74680
Contract NAS8-11477
NASA-CR-69704

Descriptors: *Instrument package, *Manufacturing, *Saturn S-IVB stage, *Parking orbit.

N66-16391 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
California Inst. of Tech., Pasadena.
A MODEL OF W VIRGINIS WITH RV TAURI CHARACTERISTICS.
by R. F. Christy. Jan 66, 12p
Grant NsG-426
NASA-CR-69820

Descriptors: *Astronomical model, *Celestial body, *T-Tauri star.

AD-293 400 **See Field 17B**

AD-459 051 **See Field 8E**

AD-459 428 **See Field 8E**

AD-462 346 **See Field 10B**

AD-634 871 **See Field 9E**

AD-634 910 **See Field 4A**

AD-634 953 **See Field 4A**

AD-634 976 **See Field 4A**

AD-635 162 **See Field 4A**

AD-635 185 **See Field 4B**

AD-635 522 **See Field 6K**

PB-169 913 **See Field 4B**

22C. SPACECRAFT TRAJECTORIES AND REENTRY

AD-471 885 **Field 22C, 12A**
CFSTI Prices: HC$6.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF FIRST INJECTION ERRORS UPON THE ACCURACY OF HIGH CIRCULAR ORBITS WHEN THE TRAJECTORY INCLUDES LOW ALTITUDE PARKING AND ELLIPTIC TRANSFER.
Technical rept.
by Keith Smith. Jul 65, 46p TR-65154

Descriptors: (*Parking orbit trajectories, Errors), Transfer trajectories, Satellites (Artificial), High-orbit trajectories, Low-orbit trajectories, Injection, Velocity, Partial differential equations, Mathematical analysis, Astronautics, Great Britain.

First order analysis, previously made, to determine the relation between position and velocity errors at the start and end of a Hohmann transfer is extended to cover a prior phase of low altitude circular orbit parking. The results are used to find the effects of uncorrected first injection errors upon the parameters of the final orbit. In particular the effects of prolonged parking are studies. (Author)

AD-481 079 **Field 22C, 22A**
CFSTI Prices: HC$3.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE ORBIT OF ARIEL 2 (1964-15A) - THE FIRST TWELVE MONTHS.
Technical rept.
by R. H. Gooding. Dec 65, 51p TR-65274

Descriptors: (*Astronautics, Great Britain), (*Satellites (Artificial), Great Britain), Orbital trajectories, Satellite tracking systems, Position finding, Data.

Identifiers: Ariel 2.

The definitive orbit for Ariel 2 (1964-15A) is computed, from Minitrack observation, for a period of twelve months from the launch of the satellite. The orbit is described by a model with eight orbital parameters and these parameters are listed at every twenty-fifth nodal passage. The angular observations are accurate to about 1 minute and, as a result, the average computed standard deviations of the eight fitted orbital parameters are as follows: 1 m in semi-major axis, 0.00001 in eccentricity, 2 seconds in inclination, 4 seconds in right ascension of the node, 30seconds in argument of perigee, O .03 in time at the node, and 0.001 deg/dsquared and 0.001 deg/dcubed in the linear and quadratic coefficients occurring in the mean motion polynomial. Ephemerides computed from the listed orbital parameters will be accurate to about 1/2 km, the accuracy required by the Ariel 2 experimenters. Limitations which prevent the accuracy from being better than this are discussed. (Author)

AD-635 137 **Field 22C, 171**
CFSTI Prices: HC$4.00 MF$0.50
Mitre Corp., Bedford, Mass.
COMPARISON OF GENERAL PERTURBATIONS AND SPECIAL PERTURBATIONS EPHEMERIDES.
by Edward H. Larson, and James B. Frazer. Jun 66, 26p MTR-22
Contract AF 19 (628)-5165
Proj. AF-4965
ESD-TR-66-119

Descriptors: (*Perturbation theory, *Satellite tracking systems), (*Space surveillance systems, Satellite tracking systems), Radar tracking, Satellites (Artificial), Orbital trajectories, Celestial mechanics, Programming (Computers).

Identifiers: Spacetrack.

The accuracy of the SPACETRACK General Perturbations program over short periods is evaluated for a number of cases. They show that oscillatory terms resulting from drag perturbations contribute heavily to errors at low altitudes, and that these terms must be eliminated if the first order theory is to be used for high accuracy in these circumstances. It appears that the evaluation technique employed would be useful in addressing a number of other problems; several promising applications are discussed. (Author)

AD-635 235 **Field 22C**
CFSTI Prices: HC$1.50 MF$0.75
Auburn Univ., Ala.
ON THE EFFECT OF AN OBLATE ATMOSPHERE ON THE SATELLITE DECELERATION EQUATIONS.
Master's thesis.
by Theodore Carlton Gerst. 24 Aug 66, 63p
Contract AF 33 (608)-1207

Descriptors: (*Satellites (Artificial), *Atmosphere entry), Drag, Perturbation thoery, Deceleration.

Identifiers: Theses, Oblateness.

This paper deals with the development of relationship between the semimajor-axis and the revolution number of a close earth satellite in the presence of atmospheric drag. The atmospheric density is represented by a power function with an integer exponent. The power function is modified to take account of atmospheric oblateness. A relationship is first derived between the semmnajor axis and the revolution number for a spherically symmetrical atmosphere. This relation is used as a core solution and a procedure is outlined for extending the solution to include the effects of atmospheric oblateness. These effects are treated as perturbations of the core solution. The perturbing terms are developed analytically as functions of a single variable. Several approximations are suggested for use in further development of the theory. (Author)

AD-635 245 **Field 22C**
CFSTI Prices: HC$6.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
OPTIMAL CO-ALTITUDE RENDEZVOUS WITH CONSTANT THRUST ACCELERATION.
Master's thesis.
by Paul G. Kaminski. Jun 66, 83p
Contract AF 33 (608)-1249

Descriptors: (*Rendevous trajectories, Optimization), (*Thrust, Acceleration), Boundary value problems, Numerical analysis, Programming (Computers), Iterative methods.

A family of minimum time rendezvous trajectories is presented for a pursuer and target initially in the same circular orbit but separated by the central angle beta null. The thrust acceleration of the pursuer is constrained to a constant magnitude so that the control variable is the thrust angle. With this constraint, minimum time and minimum fuel solutions are identical. Solutions are presented for two cases, the first involving a near-optimal thrust angle program generated using a set of linearized adjoint equations, and the second involving the optimal program generated with the true adjoint equations. In each case the form of the thrust angle program is developed in terms of four constants which are chosen to solve the two-point boundary value problem associated with rendezvous. These constants are determined by iteration using the Newton-Raphson method. (Author)

N66-16182 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
OPTIMIZATION OF MIDCOURSE VELOCITY CORRECTIONS.
by J. E. Potter, and R. G. Stern. Nov 65, 21p RE-17
Grant NsG-254-62
NASA-CR-69881

Descriptors: *Midcourse guidance, *Mathematical model, *Optimization, *Time factor, *Velocity error.

For abstract, see T 66 16.

N66-16389 **Field 22C**
CFSTI Prices: HC$7.00 MF$2.00
Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
LUNAR NAVIGATION STUDY, SECTIONS 8 THROUGH 10 and APPENDICES.
Final rept. Jun 64-May 65.
by L. J. Abbeduto, M. E. Amdursky, D. K. Breseke, J. T. Broadbent, and R. A. Gill. Jun 65, 414p
Contract NAS8-11292
NASA-CR-68285

Descriptors: *Lunar landing module, *Component reliability, *Lunar surface, *Navigation system.

N66-16565 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AN ANALYTICAL INVESTIGATION OF A SIMPLIFIED THRUST-VECTOR ORIENTATION TECHNIQUE FOR ESTABLISHING LUNAR ORBITS.
by L. K. Barker, and G. W. Sparrow. Feb 66, 24p
NASA-TN-D-3296

Descriptors: *Lunar orbit, *Parking orbit, *Satellite orientation, *Thrust vector control/tvc/.

AD-441 139 **See Field 4A**

AD-634 785 **See Field 4A**

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

N66-15341 **Field 22D**
CFSTI Prices: HC$4.00 MF$0.75
Northrop Space Labs., Huntsville, Ala.
DESIGN AND ANALYSIS OF UNLOADING AND TIEDOWN SYSTEMS. APOLLO LOGISTICS SUPPORT SYSTEMS MOLAB STUDIES.
Technical rept. 1 Oct-7 Dec 64.
by J. E. Ligocki, and G. J. Youngblood. Dec 64, 115p
Contract NAS8-11096
NASA-CR-61048

Descriptors: *Logistics, *Lunar mobile laboratory (MOLAB), *Control system, *Loading, *Remote control.

* U.S. GOVERNMENT PRINTING OFFICE : 1966 O—252-086—(4)

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GQA 411 1 FIELD 4A, 8+, 9+,20I

PENNSYLVANIA ST UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, PENNSYLVANIA

AN EXPERIMENTAL STUDY OF POSITIVE AND NEGATIVE ION CONCENTRATION IN THE 30-80 KM ALTITUDE RANGE

L. C. HALE

DA-ARO-D-31-124-G659
/65- /

DOD-ARMY

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GQA 541 FIELD 8K, 4A, 8+, 9+

V L F ATMOSPHERIC STUDIES

P. KAUFMANN

DA-ARO-49-092-65-G77
/65- /

DOD-ARMY

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GQF 3528 2 FIELD 4A,20J, 7B

MELLON INST OF INDUS, PENNSYLVANIA

ELECTRONIC COLLISION CROSS SECTION

E. N. LASSETTRE

AF-AFOSR-0061-63
/65- /

DOD-AIR FORCE

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GQF 258175 1 FIELD 4A,20F

UNIV OF CAL-L. A., GRADUATE SCHOOL, METEOROLOGY, CALIFORNIA

THEORETICAL STUDIES OF RADIATIVE TRANSFER IN TURBID ATMOSPHERES AND MSMTS OF SKYLIGHT INTENSITY

Z. SEKERA

AF-19-628-03850
/65- /

DOD-AIR FORCE

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GQF 258179 3 FIELD 4A,20F, 7B

PHYS METEOROL OBSERV, SWITZERLAND

STUDY OF THE INTENSITY + SPATIAL DISTRIBUTION OF UV SKY RADIATIONS IN WIDE RANGE OF ATOMS TURBIDITY

W. MORIKOFER

AF-61-052-00618
/65- /

DOD-AIR FORCE

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GQF 258477 1 FIELD 4A

INST GEOFISICO HNCAYO, PERU

THEORETICAL + EXPERIMENTAL STUDY OF EXOSPHERIC PROTON RADIATION IN THE 10CPS TO 10KCPS FREQ RANGE

I. A. GIESECKE

AF-AFOSR-0651-64
/65- /

DOD-AIR FORCE

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GQF 258570 1 FIELD 4A,18A,20H

UNIVERSITY OF MILAN, ITALY

STUDY OF ABSOLUTE FLUX + ENERGY SPECTRUM OF ALBEDO NEUTRON FLUX OF EARTHS RADIATION ENVIRONMENT

G. OCCHIALINI

AF-61-052-00808
/65- /

DOD-AIR FORCE

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GQF 258589 2 FIELD 4A, 8+, 9+, 9A

ELECTRO-MECHANICS CO, AUSTIN, TEXAS

STUDY AND PROCESSING OF VARIABLE MAGNETOGRAM DATA

P. G. VARLASKIN

AF-19-628-02815
/65- /

DOD-AIR FORCE

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GQP 75271 FIELD 22B,22A, 4A, 7B

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

MEASUREMENT OF NITRIC OXIDE NO IN THE EARTHS ATMOSPHERE

R. A. YOUNG, G. BLACK

DA-49-146-XZ-112
/65- /

DEFENSE-ATOMIC SUPPORT AGENCY

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GSP 2448 FIELD 4A, 5A

WASHINGTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MISSOURI

PRIMARY COSMIC RADIATION

M. W. FRIEDLANDER, J. KLARMANN

NSF-GP-4546
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2485 FIELD 4A, 5A

UNIV OF ROCHESTER, GRADUATE SCHOOL, PHYSICS, NEW YORK

PRIMARY GAMMA AND PARTICLE COSMIC RADIATION

M. F. KAPLON

NSF-GP-4371
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

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ZPE 746 2 FIELD 4B, 7B

US, AEC, LAMONT, ILLINOIS

ATMOSPHERIC DIFFUSION STUDIES

H. MOSES, J. E. PEARSON, J. R. STINSON

/65- /

AEC-BIOLOGY + MEDICINE

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ZPE 749 2 FIELD 4B, 9+, 9A

US, AEC, LAMONT, ILLINOIS

THE USE OF INFRARED TECHNIQUES FOR METEOROLOGICAL STUDIES

H. MOSES

/65- /

AEC-BIOLOGY + MEDICINE

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ZPE 750 2 FIELD 4B,12A, 8E

US, AEC, LAMONT, ILLINOIS

METEOROLOGICAL MODEL STUDIES

H. MOSES

/65- /

AEC-BIOLOGY + MEDICINE

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ZPE 751 2 FIELD 13B, 4B,12A, 8E

US, AEC, LAMONT, ILLINOIS

MEASUREMENT OF METEOROLOGICAL DATA

H. MOSES, J. E. CARSON

/65- /

AEC-BIOLOGY + MEDICINE

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ZPE 1006 FIELD 20D, 5A

METEOROLOGICAL MODEL STUDIES-MODELING ATMOSPHERIC DIFFUSION IN A WIND TUNNEL

G. H. STROM, H. MOSES, G. A. STROM

/66- /

AEC-BIOLOGY + MEDICINE

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ZPE 1008 FIELD 18,22D, 5A

WIND PROFILE DETERMINATION BY TRACKING IONIZED AIR COLUMN

H. MOSES, T. V. BANFIELD, S. L. HALVERSON J. KASTNER

/66- /

AEC-BIOLOGY + MEDICINE

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ZPE 1033 FIELD 7D, 7A, 4A,18A

US, AEC, OPER OFFICE, NEW YORK

UPPER AIR STUDIES

G. A. WELFORD, J. S. ALERCIO, N. Y. CHU L. P. SALTER, D. STURNIOLO

/66- /

AEC-BIOLOGY + MEDICINE

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ZQF 260044 FIELD 1C, 3A, 3B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ADVANCE ATMOSPHERIC RECONNAISSANCE TECHNIQUES

R. W. COWNE

/65- /

DOD-AIR FORCE

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ZQF 260064 FIELD 4A, 8+, 9+, 9A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SATELLITE DENSITY MEASUREMENTS

C. G. STERGIS

/65- /

DOD-AIR FORCE

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ZQF 260066 FIELD 22C, 4A,12A, 8E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

DENSITY DETERMINATIONS FROM SATELLITE ORBITS

K. S. CHAMPION

/65- /

DOD-AIR FORCE

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ZQF 260169 FIELD 18,22D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INVESTIGATION OF THUNDERSTORM ELECTRICITY

D. R. FITZGERALD

/65- /

DOD-AIR FORCE

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ZQF 260174 FIELD 1C, 1B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

NEW CLIMATOLOGICAL TECHNIQUES

I. I. GRINGORTEN

/65- /

DOD-AIR FORCE

••••••••••

ZUA 856 FIELD 4A

REFRACTION CORRECTIONS FROM METEOROLOGICAL DATA

J. B. ROWLAND

INT-GS-50-05
/66- /

INTERIOR-GEOLOGICAL SURVEY

••••••••••

ZUF 270 FIELD 8H, 4A

USDI, BUR RECLAM, DENVER, COLORADO

RADIO METHODS FOR DETERMINING WATER VAPOR CONTENT OF AIR

Q. L. FLOREY, B. R. BEAN, R. E. MCGAVIN H. D. NEWKIRK

/66- /

INTERIOR-BUREAU OF RECLAMATION

05 BEHAVIORAL AND SOCIAL SCIENCES

••••••••••

GH 1516 1 FIELD 5A

AMER BAR FOUNDATION, ILLINOIS

RESEARCH ON THE LAW OF OUTER SPACE INCLUDING REVIEW, ANALYSIS + SYNTHESIS OF INTERGOVERNMENTAL ARRANGEMENTS, GOVERMENTAL POSITIONS

S. H. LAY, H. TAUBENFELD

NSR-14-041-001
9/65- 8/66

NASA

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ZBF 26 FIELD 9+,12A, 5C

USDC, BUR OF CENSUS, MARYLAND

AUTOMATION OF MICROFILMING

A. A. BERLINSKY

/66- /

COMMERCE-BUREAU OF CENSUS

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ZBF 33 FIELD 12A, 5C

USDC, BUR OF CENSUS, MARYLAND

CENSUS-SERTS RECONCILIATION

P. R. OHS

/66- /

COMMERCE-BUREAU OF CENSUS

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ZBF 34 FIELD 12A, 5C

USDC, BUR OF CENSUS, MARYLAND

BES-RETAIL CENSUS PAYROLL RECONCILIATION

P. R. OHS

/66- /

COMMERCE-BUREAU OF CENSUS

06 BIOLOGICAL AND MEDICAL SCIENCES

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1FR 273 1 FIELD 7C, 7D,20J

UNIV OF PITTSBURGH, SCHOOL OF PUBLIC HLTH, BIOCHEM + NUTRITION, PENNSYLVANIA

MASS SPECTROMETRIC FACILITY FOR BIOMEDICAL RESEARCH

C. C. SWEELEY, R. ABRAMS, T. AKITA R. BENTLEY, S. KIM, N. C. SAHA A. G. SHARKEY

10/65- 9/66

PHS-NIH-RESEARCH FACILITIES + RESOURCES

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1GM 13191 2 FIELD 7C, 7D,20J, 5A

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

ESR EXPERIMENTS ON MODEL PHOTOSYNTHETIC SYSTEMS

G. FEHER, O. C. MAUZERALL

4/66- 3/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13912 1 FIELD 6B, 9+

COLUMBIA UNIVERSITY, SCHOOL OF MEDICINE, ANESTHESIOLOGY, NEW YORK

APPLICATION OF ENGINEERING TO PROBLEMS IN MEDICINE

A. S. LEE, R. M. EPSTEIN, S. GRAFF D. V. HABIF, J. R. MALM, G. G. NAHAS H. RACKOW

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13956 1 FIELD 7C, 7A, 7D

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

REARRANGEMENTS RELATING TO TERPENE BIOGENESIS

R. M. COATES

3/66- 2/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13980 2 FIELD 7C, 7A, 7D,20M

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

NEW METHODS OF PEPTIDE SYNTHESIS

R. A. OLOFSON

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

••••••••••

GPE 995 1 FIELD 8G

UNIVERSITY OF ICELAND, ICELAND

BIOLOGICAL RESEARCH ON THE VOLCANIC ISLAND SURTSEY AND ENVIRON

S. FRIDRICKSSON

AT-30-1-3549
5/65- 5/66

AEC-BIOLOGY + MEDICINE

••••••••••

GPE 1138 FIELD 6B, 9+, 9A

WESTERN RESERVE UNIV, SCHOOL OF MEDICINE, RADIOLOGY, OHIO

PULSED ELECTRON BEAM DOSIMETRY

E. C. GREGG

W-31-109-ENG-78
10/65- 9/66

AEC-BIOLOGY + MEDICINE

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ZPE 1655 FIELD 7C, 7D

US, AEC, ORNL, ONAL LAB, TENNESSEE

OLIGONUCLEOTIDE SEPARATIONS

W. E. COHN, M. UZIEL

W-7405-ENG-26
/66- /

C-BIOLOGY + MEDICINE

••••••••••

ZPE 1736 FIELD 7C, 7D, 7B

US, AEC, ORNL, ONAL LAB, TENNESSEE

PROTEIN CRYSTAL STRUCTURE BY X-RAY DIFFRACTION

J. R. EINSTEIN, R. B. SETLOW

W-7405-ENG-26
/66- /

AEC-BIOLOGY + MEDICINE

07 CHEMISTRY

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1AM 10399 1 FIELD 7C, 7D

UNIV OF WISCONSIN, SCHOOL OF PHARMACY, PHARMACEUTICAL CHEM, WISCONSIN

SYNTHESIS OF 11-FUNCTIONALIZED STEROIDS

P. A. HART

1/66-12/66

PHS-NIH-NATL INST ARTHRITIS + METAB DIS

••••••••••

1GM 6168 8 FIELD 7C, 7D,20J

SYRACUSE UNIVERSITY, SCHOOL OF FORESTRY, CHEMISTRY, NEW YORK

ADDITION POLYMERIZATION OF ANHYDRO SUGARS TO DEXTRANS

C. SCHUERCH, R. H. MARCHESSAULT

4/66- 3/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 8797 5 FIELD 7C, 7D

UNIV OF CINCINNATI, GRADUATE SCHOOL, CHEMISTRY, OHIO

A NEW REARRANGEMENT YIELDING HETEROCYCLIC SYSTEMS

H. ZIMMER

11/65-10/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 12512 2 FIELD 7C, 7B

ADELPHI UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

SELENIUM AROMATIC FREE RADICALS

J. M. DWYER

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 12592 2 FIELD 7C, 7A, 7D,20M

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

PHOTOPROCESSES IN THE ORGANIC SOLID STATE

R. M. HOCHSTRASSER

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 12692 2 FIELD 7C, 7D

UNIVERSITY OF DELAWARE, GRADUATE SCHOOL, CHEMISTRY, DELAWARE

RING SYNTHESIS FROM VINYL TRIPHENYL PHOSPHONIUM BROMIDE

E. E. SCHWEIZER

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 13194 1 FIELD 7C, 7D, 6B, 7A

NORTHWESTERN UNIV, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

DEVELOPMENT OF A MASS SPECTROMETER FOR MACROMOLECULES

M. DOLE, D. BODILY, R. L. HINES

3/66- 2/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13451 1 FIELD 7C, 7A, 7D,20J

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

REACTIVE STATES OF PHOTOEXCITED UNSATURATED KETONES

P. E. EATON

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13556 2 FIELD 7C, 7A, 7D,20M

YALE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CONNECTICUT

PROBLEMS IN THEORETICAL CHEMISTRY AND POLYMERS

M. FIXMAN, A. HORTA, N. SNIDER
H. STIDHAM

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 13638 1 FIELD 7C, 7D, 7A,20M

STANFORD UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

ORGANIC GROUPS IN REDOX REACTIONS OF METAL IONS

H. TAUBE, J. K. HURST, F. R. NORDMEYER
R. ROBSON, W. G. SCHMIDT

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13651 1 FIELD 7C, 7D,20J

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

AROMATIC, PSEUDOAROMATIC AND ANTIAROMATIC SYSTEMS

R. C. BRESLOW

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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1GM 13854 1 FIELD 7C, 7A, 7D

YALE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CONNECTICUT

REACTIONS OF OXYGEN WITH HETEROCYCLIC SYSTEMS

H. H. WASSERMAN, P. KEEHN

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 13962 1 FIELD 7C, 7D,20J

STATE UNIV N Y BUFFALO, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

STEREOCHEMISTRY OF AMINO ACID-METAL COMPLEXES

C. R. HARE, S. BOGDANSKI, D. LANGS
B. MANHAS, K. M. WELLMAN

2/66- 1/67

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 13966 1 FIELD 7C, 7D, 7A,20J

PRECISION PRODUCTION OF ORGANIC TRACERS REACTION STUDIES

R. D. FINK

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 14020 1 FIELD 7C, 7A, 7D,20J

UNIV OF ALBERTA, GRADUATE SCHOOL, CHEMISTRY, CANADA

THE RADIOLYSIS OF CYSTEINE AND OTHER THIOLS

D. A. ARMSTRONG

10/65- 9/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 14254 1 FIELD 7C, 7D

STEREOSPECIFIC REACTIONS OF COORDINATED MOLECULES

C. F. LIU

9/65- 8/66

S-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 14285 1 FIELD 7C, 7A, 7D,20M

TEXTILE RES. INST.,, NEW JERSEY

DIFFUSION OF MACROMOLECULES THROUGH LIQUID BARRIERS

B. MILLER

2/66- 8/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1GM 14292 1 FIELD 7C, 7A,20J

UNIV OF WASHINGTON, GRADUATE SCHOOL, CHEMISTRY, WASHINGTON

ENERGY TRANSFER IN PORPHYRINS

M. GOUTERMAN, D. EASTWOOD, L. EDWARDS

3/66- 8/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

.....

1HE 10100 1 FIELD 7C, 7D

UNIV OF CAL-L. A., GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

SYNTHESIS OF DIAZAPHENANTHRINE ALKALOIDS

J. C. POWERS

1/66-12/66

PHS-NIH-NATL HEART INST

.....

7GX 3159 2 FIELD 7C, 7D

UNIVERSITY OF MAINE, GRADUATE SCHOOL, CHEMISTRY, MAINE

CHEMICAL FACTORS RELATED TO KRAFT ODOR CONTROL

I. B. DOUGLASS, R. V. NORTON, L. PRICE

7-AP-00383-02
10/65- 9/66

PHS-BSS

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7GX 3677 1 FIELD 7A, 7D

UNIV OF TEXAS, AUSTIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, TEXAS

DYNAMICAL THEORIES OF KNUDSEN AEROSOLS

J. R. BROCK

7-AP-00479-01
2/66- 1/67

PHS-BSS

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GPF 935 FIELD 7A, 7D,20M, 7B

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, NEW JERSEY

ION MOBILITY IN MOLTEN SALTS

R. W. LAITY

AT(30-1)3608
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

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GQA 223 1 FIELD 5A,20D, 7B

MOLECULAR BEAMS - CESIUM BEAM INVESTIGATIONS

J. G. KING, J. *. KING

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

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GQA 225 1 FIELD 5A,20H, 7B

MOLECULAR BEAMS - NEUTRALITY OF ATOMS

J. G. KING, J. *. KING

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

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GQA 306 1 FIELD 5A, 7B

MOLECULAR BEAMS - AMMONIA BEAM INVESTIGATIONS

J. G. KING, J. *. KING

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

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GQA 333 1 FIELD 7C, 7D,20J, 7B

UNIV OF TEXAS, AUSTIN, GRADUATE SCHOOL, CHEMISTRY, TEXAS

PI-ELECTRON DISTRIBUTION AND SUBSTITUENT EFFECTS IN AROMATIC SYSTEMS

M. J. DEWAR

DA-ARO-D-31-124-G496
/65- /

DOD-ARMY

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GQA 336 1 FIELD 7C, 7D,11F,11G

PENNSYLVANIA ST UNIV, SCHOOL OF MINERAL IND, METALLURGY, PENNSYLVANIA

INTERMETALLIC COMPOUNDS OF YTTRIUM

E. R. RYBA

DA-31-124-ARO-D-129
/65- /

DOD-ARMY

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GQA 348 FIELD 7D,11F, 7B

UNIV OF TEXAS, AUSTIN, GRADUATE SCHOOL, CHEMISTRY, TEXAS

THE ADSORPTION OF WATER VAPOR ON EVAPORATED IRON FILMS SELECTIVELY CONTAMINATED WITH CHEMISORBED OXYGEN

W. H. WADE

DA-ARO-D-31-124-G572
/65- /

DOD-ARMY

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GQA 414 2 FIELD 7D, 7C, 7A, 7B

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, CHEMISTRY, NORTH CAROLINA

METAL ION HYDROLYSIS AND AGGREGATION

S. Y. TYREE

DA-ARO-D-31-124-G364
/65- /

DOD-ARMY

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GQA 429 1 FIELD 7D, 7C,21B, 7A

HOMOGENEOUS AND HETEROGENEOUS CHEMICAL REACTIONS IN FLOW

S. S. PENNER

DA-ARO-D-31-124-G504
/65- /

DOD-ARMY

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GQA 430 1 FIELD 7C, 7D,20J, 7B

TRANSITION METAL COMPLEXES WITH TWO NEW SERIES OF TETRADENTATE LIGANDS

D. W. MEEK

DA-ARO-D-31-124-G500
/65- /

DOD-ARMY

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GQA 466 1 FIELD 7C,21I,20J, 7B

MARTIN CO BALTIMORE, MARYLAND

THEORETICAL AND QUANTUM CHEMISTRY OF N O F COMPOUNDS

J. J. KAUFMAN

DA-31-124-ARO-D-203
/65- /

DOD-ARMY

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GQA 470 1 FIELD 7D, 7B

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

INVESTIGATION OF THE INFLUENCE OF THE STRUCTURE AND COMPOSITION OF CLEAN SOLID SURFACES ON THE NATURE + BEHAVIOR OF SOLID-FLUID INTE

P. L. DEBRUYN

DA-31-124-ARO-D-187
/65- /

DOD-ARMY

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GQF 1144 5 FIELD 7B

CORNELL AERONAUT. LA, NEW YORK

MOLECULAR INTERACTIONS AT HIGH TEMPERATURE

A. J. COHEN

AF-49-638-01490
/65- /

DOD-AIR FORCE

****

GQF 1244 5 FIELD 5A

TEXAS A + M UNIVERSITY, GRADUATE SCHOOL, PHYSICS, TEXAS

ELECTRONIC SPECTRA OF SIMPLE MOLECULES

J. B. COON

AF-AFOSR-0326-63
/65- /

DOD-AIR FORCE

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GQF 3147 3 FIELD 7D,12A,20J

UNIV OF MINNESOTA, GRADUATE SCHOOL, CHEMISTRY, MINNESOTA

ANHARMONIC POTENTIAL FUNCTIONS OF POLYATOMIC MOLECULES

J. OVEREND

AF-AFOSR-0570-64
/65- /

DOD-AIR FORCE

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GQF 3163 3 FIELD 7C, 7D,20J, 7B

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

ELECTRONIC SPECTRA AND BONDING IN CONJUGATED MOLECULES

L. GOODMAN

AF-AFOSR-0742-65
/65- /

DOD-AIR FORCE

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GQF 3189 3 FIELD 7C, 7D,20M,11B

TEMPLE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

PLASMA JET CHEMISTRY

A. V. GROSSE

AF-AFOSR-0775-65
/65- /

DOD-AIR FORCE

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GQF 3239 3 FIELD 20M,20J,20D, 7B

ISR INST OF TECHNOLOGY, ISRAEL

HIGH TEMPERATURE INFRARED SPECTROSCOPY

U. P. OPPENHEIM

AF-EOAR-0084-65
/65- /

DOD-AIR FORCE

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GQF 3379 2 FIELD 7D, 7C, 7B

VICTORIA UNIVERSITY, NEW ZEALAND

USE OF THE MOSSBAUER EFFECT IN CHEMISTRY

J. F. DUNCAN

AF-AFOSR-0027-65
/65- /

DOD-AIR FORCE

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GQF 3463 2 FIELD 7D,20M,20J,20I

UNIV OF BRITISH COL, GRADUATE SCHOOL, CANADA

ATOM RECOMBINATION

E. A. OGRYZLO

AF-AFOSR-0158-65
/65- /

DOD-AIR FORCE

****

GQF 3526 2 FIELD 7C, 7D,21B, 7A

UNIV OF CANTERBURY, D, NEW ZEALAND

GAS-PHASE REACTIONS

L. F. PHILLIPS

AF-AFOSR-0264-65
/65- /

DOD-AIR FORCE

****

GQF 3567 2 FIELD 7C, 7D,21D,21I

MARTIN CO BALTIMORE, MARYLAND

THEORETICAL AND QUANTUM CHEMISTRY OF BORON BERYLLIUM AND ALUMINUMCOMPOUNDS

J. KAUFMAN

AF-49-638-01530
/65- /

DOD-AIR FORCE

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MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

THERMODYNAMICS OF SULFIDES AND GAS-METAL KINETICS

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SOLUBILITY OF ZIRCON(ZRSIO4) IN THE SYSTEM NAALSIO4 - KALSIO4 - SIO2 - H2O

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CASE INST OF TECHNOL, GRADUATE SCHOOL, PHYSICS, OHIO

FINE AND HYPERFINE STRUCTURE OF EXCITED ATOMS

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PHASE TRANSITIONS IN CRYSTALLINE FREE RADICALS

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THEORY OF HIGH ENERGY ATOMIC COLLISIONS

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MAGNETIC PROPERTIES OF SOLID FREE RADICALS AT LOW TEMPERATURES

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FIELD OPERATION OF A 20 GALLON A DAY PILOT PLANT UNIT FOR ELECTROCHEMICAL DESALINATION OF BRACKISH WATER

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INTERIOR-OFFICE OF SALINE WATER

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STUDIES ON THE AMINATION OF STARCH FOR THE PURPOSE OF MODIFYING ITS CHEMICAL AND PHYSICAL PROPERTIES

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INVESTIGATION OF THERMALLY STABLE STATIONARY PHASES SUITABLE FOR THE ANALYSIS OF COMPLEX LIPID FATTY ACID ESTERS

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THE KINETIC ISOTOPE EFFECT

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CHEMISTRY OF POLYHEDRAL MOLECULES

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NEIGHBORING GROUP PARTICIPATION IN THE REACTIONS OF ACETYLENIC COMPOUNDS

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ULTRAVIOLET AND VISIBLE SPECTRA OF METAL CARBONYL DERIVATIVES

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SYNTHESIS OF HIGH POLYMERS THRUGH 1,3-

DIPOLAR CYCLOADDITIONS

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A STUDY OF PHOTOCHEMICAL CYCLOADDITION REACTIONS

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ABSORPTION SPECTRA OF METAL-AMINE SOLUTIONS

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THE CONFORMATIONAL PREFERENCE OF THE NONBONDING ELECTRON PAIR IN PIPERIDINE

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MECHANISM OF ELIMINATION OF WATER FROM P-HYDROXYLAMINE PHENOL BY ELECTROCHEMISTRY

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ELECTRONIC ENERGY OF DIATOMIC MOLECULES

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REACTIONS OF METHYLENE RADICALS WITH SILANES AND THE UNIMOLECULAR DECOMPOSITION OF VIBRATIONALLY ENERGIZED ORGANOSILANES

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THE OPTICAL ACTIVITY OF OXATHIOLANES AND RELATED COMPOUNDS

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INFLUENCE OF IN-PLANE STRAIN UPON CARBONIUM ION STABILITY

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THE ALCOHOL-ACID N-ALKYLATION OF HETEROCYCLES

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THE RELATIONSHIP BETWEEN BASICITY AND COORDINATING ABILITY OF TERTIARY AMINES IN TERMS OF THE MOLECULAR STRUCTURE OF THEIR COMPLEXES

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PCS 439 FIELD 7C, 7D,20J

CHARGE DISTRIBUTION OF INTERMEDIATES IN PHOTOCHEMICAL CYCLOADDITION REACTIONS

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PCS 440 FIELD 7D,20D

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TRANSPORT WITH HOMOGENEOUS CHEMICAL REACTION IN A TURBULENT BOUNDARY LAYER.

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PHOTOLYTIC PREPARATION OF SULFENES

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MINERAL-WATER CHEMISTRY, GREAT LAKES

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GH 1469 1 FIELD 3A, 8D, 8F, 8G

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COMPARATIVE STUDY OF LUNAR CRATERS AND TERRESTRIAL VOLCANO-TECTONIC DEPRESSIONS IN RHYOLITE ASH-FLOW PLATEAUS

W. E. ELSTON, P. J. CONEY

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8/65- 7/66

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GSE 800 1 FIELD 8H

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

RAINFALL AND RUNOFF SEQUENCES IN ENGINEERING HYDROLOGY

V. M. YEVDJEVICH, M. M. SIDDIQUI

NSF-GK-169
3/66- 3/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GSP 2129 1 FIELD 8D, 8G

UNIVERSITY NEW MEXICO, GRADUATE SCHOOL, GEOLOGY, NEW MEXICO

CLIMATIC CYCLES AND PATTERNS IN VARVED SEDIMENTS-CASTILE PROJECT

R. Y. ANDERSON, E. F. CRUFT

NSF-GP-4200
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2547 1 FIELD 8D, 8G

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

CONTAMINANTS IN QUARTZ

W. H. DENNEN

NSF-GP-4154
2/66-12/66

NSF-PHYSICAL SCIENCES DIVISION

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GUW 22 1 FIELD 13B, 8H

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, OHIO

A STUDY OF GROUNDWATER CONTAMINATION DUE TO SALINE WATER DISPOSAL IN THE MORROW COUNTY OIL FIELDS

J. H. LEHR

INT-WR-A-004-OHIO
1/66- 6/67

INTERIOR-OFFICE OF WATER RESOURCES

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GUW 356 FIELD 7D, 8H, 7B

UNIVERSITY OF NEVADA, GRADUATE SCHOOL, DESERT RESEARCH INST, NEVADA

GROUND-WATER FLOW SYSTEM ANALYSIS IN MOUNTAINOUS TERRAIN OF NEVADA

M. D. MIFFLIN, G. B. MAXEY

INT-WR-A-009-NEV
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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GUW 399 FIELD 7D, 8H, 7B

ANALYSIS OF NATURAL RADIOELEMENTS IN RAW WATER

V. C. ROSE

INT-WR-A-011-R-I
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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GUW 515 FIELD 13G, 8F, 8H, 8G

LABORATORY INVESTIGATION OF FLOW IN RIVER BENDS

H. ROUSE, E. M. LOUGHLIN, C. YEN

INT-WR-A-015-IA
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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GYE 290163 FIELD 13B, 8D, 8F, 8G

RUTGERS THE STATE UNIV, AGRICULTURAL EXPT STA, SOIL + CROP SCIENCE, NEW JERSEY

ORIGIN, DEVELOPMENT, CHARACTERISTICS AND CLASSIFICATION OF NEW JERSEY SOILS

J. C. TEDROW

AG-NJ-0030
7/65- 6/66

AGRICULTURE-DEPT OF AGRICULTURE

••••••••••

JMO 2 FIELD 13G,13B, 8H, 8G

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

INVESTIGATION OF RIPPLES AND RIPPLE BED STRATIFICATION

D. B. SIMONS

11/65- 1/66

MARATHON OIL COMPANY

••••••••••

NGI 24 FIELD 8H

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, ENGIN EXPT STATION, GEORGIA

A STUDY OF GEORGIA RIVERS AND LAKES

R. S. INGOLS

E-104
1/66- 1/67

GEORGIA INSTITUTE OF TECHNOLOGY

••••••••••

NP 20 FIELD 8D, 8G

UNIVERSITY OF COLORADO, GRADUATE SCHOOL, GEOLOGY, COLORADO

TECTONICS AND STRUCTURAL GEOLOGY OF THE SIERRA CUCAPAS, NORTHEASTERN BAJA CALIFORNIA, MEXICO

F. BARNARD

/66- /

COLORADO, UNIVERSITY OF

••••••••••

PCS 395 FIELD 8D, 8G

STRATIGRAPHIC AND BIOSTRATIGRAPHIC CORRELATIONS OF UPPER MISSISSIPPIAN TO LOWER PENNSYLVANIAN ROCKS OF THE CORDILLERAN REGION

E. E. SCHLEH

417-G
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 409 FIELD 8K

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

AN EXPERIMENTAL AND THEORETICAL STUDY OF SEISMIC ARRAYS

A. F. GANGI

458-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 428 FIELD 8G

ELECTRON MICROSCOPY OF PELAGIC LIMESTONES

R. E. GARRISON

515-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 482 FIELD 8D, 8H, 8G

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, GEOLOGY, MARYLAND

CHEMICAL BEHAVIOR OF THE ROCK-FORMING

SILICATE MINERALS IN THE NATURAL WATER ENVIRONMENT

O. P. BRICKER

665-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PRW 4 1 1 FIELD 8D, 8G, 7B

RICE UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, TEXAS

GEOCHEMISTRY OF THORIUM

J. A. ADAMS, J. J. ROGERS

C-009
5/65- 4/66

WELCH, ROBERT A FOUNDATION-TEXAS

•••••••••

ZPE 1435 FIELD 13B, 8D, 8F, 8H

HYDROLOGIC AND GEOLOGIC RESEARCH ON THE TRANSPORT OF LIQUID RADIOACTIVE WASTES THROUGH THE EARTH ENVIRONMENT

W. A. HANEY, R. E. BROWN, L. G. KING
R. W. NELSON, J. R. RAYMOND
A. E. REISENAUER

/66- /

AEC-BIOLOGY + MEDICINE

•••••••••

ZQN 544084 FIELD 13B, 8H

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ABLATION INVESTIGATIONS IN ICE AND SNOW

W. S. STEHLE

/65- /

DOD-NAVY

•••••••••

ZQN 544217 1 FIELD 13B,12A,20D

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

UNIFIED CONSOLIDATION THEORY

J. P. NIELSEN, J. A. BISHOP

/65- /

DOD-NAVY

•••••••••

ZT 47 3 FIELD 8D

TENN VALLEY AUTHORITY, TENNESSEE

COAL RESERVE INVESTIGATIONS, WESTERN KENTUCKY

NONE

/66- /

TENNESSEE VALLEY AUTHORITY

•••••••••

ZT 110 2 FIELD 20M, 8H,20D

TENN VALLEY AUTHORITY, TENNESSEE

BASIC STREAM AND RESERVOIR HEAT BUDGET STUDIES

NONE
/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 119 1 FIELD 8H, 8E,12A

TENN VALLEY AUTHORITY, TENNESSEE

DEVELOPMENT OF HYDROLOGIC ANALYSIS TECHNIQUES

. NONE

/66- /

TENNESSEE VALLEY AUTHORITY

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ZUA 691 2 FIELD 8H

USDI, GEOL SURV, DIST OF COLUMBIA

HYDROLOGY OF GLACIAL TERRANES

R. SCHNEIDER

/65- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 814 FIELD 8H, 8G,12A, 8E

USDI, GEOL SURV, DIST OF COLUMBIA

DIGITAL COMPUTER METHOD FOR COMPUTING SEDIMENT DISCHARGE

M. D. EDWARDS
ACA-15-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 819 FIELD 13G, 8H, 8G,12A

USDI, GEOL SURVEY, FORT COLLINS, COLORADO

LONGITUDINAL DISPERSION OF SILT-SIZE SEDIMENT PARTICLES IN TURBULENT OPEN-CHANNEL FLOW

W. W. SAYRE

RMA-104-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 821 FIELD 8H,12A, 8E,13M

USDI, GEOL SURV ARLGTN, VIRGINIA

SYSTEMS ANALYSIS OF HYDROLOGIC PROCESSES

E. J. GILROY, N. C. MATALAS, G. F. SMOOT

ACA-31-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 822 FIELD 8D, 8H, 8G

USDI, GEOL SURV, DIST OF COLUMBIA

GEOLOGIC ASPECTS OF SEA-WATER ENCROACHMENT

J. E. UPSON

WRD-18-T
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 824 FIELD 13G, 8H, 8G,20L

USDI, GEOL SURVEY, FORT COLLINS, COLORADO

FALL VELOCITY OF FLUVIAL SEDIMENT PARTICLES IN A TURBULENT FIELD

D. D. ZIMBELMAN

RMA-150-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 825 FIELD 13B

PHOTOGRAMMETRIC ACCURACY TESTING

R. E. ALTENHOFEN

INT-GS-50-03
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 827 FIELD 8K, 8H, 8+, 9+

MOVING BOAT DISCHARGE MEASUREMENTS

T. J. BUCHANAN, T. *. BUCHANAN
G. F. SMOOT

INT-GS-NJ-4-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 829 FIELD 8F, 8H, 8G

TECHNIQUES FOR APPRAISAL OF HYDROLOGIC PARAMETERS IN DESERT BASINS
T. E. EAKIN, D. D. MOORE, E. F. RUSH
G. F. WORTS

INT-GS-NEV-24-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 830 FIELD 13B, 8H

QUANTITATIVE WATER-BUDGET ANALYSIS OF WESTERN LONG ISLAND, NEW YORK

O. L. FRANKE, G. E. SEABURN

INT-GS-NY-25-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 831 FIELD 8D, 8H, 8G

GEOHYDROLOGY OF THE POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM

H. E. GILL, D. LANGMUIR

INT-GS-NJ-31-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 832 FIELD 13B

USDI, GEOL SURVEY, DENVER, COLORADO

USE OF SMALL-SCALE PHOTOGRAPHY FOR MAPPING

J. G. GRONINGER

INT-GS-50-02
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 835 FIELD 8H, 5C, 8E

EVAPORATION LOSSES FROM LAKES IN INDIANA

R. E. HOGGATT

INT-GS-IND-8-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 836 FIELD 8D, 8F, 8H

MISSOURI SPRINGFLOW CHARACTERISTICS

A. HOMYK

INT-GS-MO-13-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 837 FIELD 8H

LAKE HYDROLOGY STUDIES

G. M. HUGHES

INT-GS-FLA-91-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 838 FIELD 13G,13F

MEASUREMENT OF HYDRAULIC FACTORS - P ERFORMANCE OF CHANNEL CHANGES

P. O. JEFFERSON

INT-GS-ALA-13-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 843 FIELD 13B

BENCH-MARK STABILITY TESTS

C. S. MALTBY
INT-GS-50-04
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 846 FIELD 8H, 7B

APPLICATION OF INSTRUMENTS TO WATER QUALITY MONITORING

D. MCCARTNEY

INT-GS-PA-23-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 847 FIELD 13B

MAPPING FROM COLOR AERIAL PHOTOGRAPHY

A. C. MCCUTCHEN

INT-GS-50-06
/66- /

INTERIOR-GEOLOGICAL SURVEY

****

ZUA 851 FIELD 8H

HYDROLOGY OF UPPER BUFFALO RIVER BASIN

W. J. PERRY

INT-GS-TENN-22-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

****

ZUA 862 FIELD 8G, 8H

THERMAL GRADIENTS IN SOUTH CAROLINA

G. E. SIPLE

INT-GS-SC-9-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 863 FIELD 8H

USDI, GEOL SURV, DIST OF COLUMBIA

FLOOD-FREQUENCY - AND BASIN PARAMETER RELATIONSHIPS IN SMALL DRAINAGE AREAS

W. P. SOMERS

INT-GS-WRD-21-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

****

ZUA 864 FIELD 8H, 8G

RELATING SEDIMENT YIELDS TO WATERSHED VARIABLES - SUSQUEHANNA RIVER BASIN

K. F. WILLIAMS

INT-GS-PA-34-CO
/66- /

INTERIOR-GEOLOGICAL SURVEY

****

ZUG 784 FIELD 7D, 8D,11F,20D

USDI, BUR MINES, SAN FRANCISCO, CALIFORNIA

PILOT STUDY OF DEPOSITION AND PREVENTION OF BARIUM SULFATE SCALE IN PRODUCING WELLS

J. W. WATKINS, W. H. CARAWAY, G. L. GATES
INT-BM-13-1598-D
/65- /

INTERIOR-BUREAU OF MINES

****

ZUG 814 FIELD 8D

USDI, BUR MINES, DENVER, COLORADO

STRESS CONCENTRATION IN INCLINED MINERAL DEPOSITS

W. L. DARE

INT-BM-6111521-17
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 815 FIELD 8G, 8D,20L, 5A

TRANSITIONAL PHASE - FUNDAMENTAL BLASTING, DYNAMIC EQUATION OF STATE, AND MECHANICS OF PRESPLITTING

D. E. FOGELSON

INT-BM-6111531-9
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 820 FIELD 8G, 8D

USDI, BUR MINES, DENVER, COLORADO

IN SITU STRESS IN ROCK OUTCROPS

V. E. HOOKER

INT-BM-6111521-12
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 821 FIELD 8K, 8D

USDI, BUR MINES, DENVER, COLORADO
PROPAGATION VELOCITY AND ROCK STABILITY

V. E. HOOKER

INT-BM-6111521-13
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 823 FIELD 8D,11C,13H,11G

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

STOPPINGS FOR VENTILATION CONTROL IN COAL MINES

E. M. KAWENSKI, J. BELCH, R. J. NIZNIK

INT-BMHS-60-12
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 826 FIELD 7C,21D, 7D, 8D

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

FACE AIRFLOW PATTERNS RESULTING FROM LINE BRATTICE SYSTEMS

J. V. LUXNER, J. W. STEVENSON

INT-BMHS-61-12
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 833 FIELD 8D, 8+, 9+, 9A

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

SONIC EXPLORATION OF COAL-MINE ROOF STRATA

F. C. MILLER, C. E. MONGAN

INT-BMHS-30-17
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 835 FIELD 19D,21D, 7D, 8D

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

FLOAT DUST TRANSPORT AND DEPOSITION

D. W. MITCHELL, M. L. BOWSER
G. J. DVORZNAK, E. M. MURPHY

INT-BMHS-60-14
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 839 FIELD 8D, 8G,20D,20K

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

FLUID PRESSURE AND ROOF STABILITY

R. M. DITTO, J. L. BANFIELD

INT-BMHS-30-16
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 845 FIELD 7C,19D,21B,21D

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

FLAME MOTION DURING DUST EXPLOSIONS

E. C. SEILER

INT-BMHS-60-15
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 847 FIELD 7C, 7D, 8D

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

EFFECT OF ATMOSPHERIC PRESSURE CHANGES ON BLEEDER ENTRIES

J. W. STEVENSON, D. S. KINGERY

INT-BMHS-61-14
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 867 FIELD 7D,21D, 8D,18A

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

DEVELOPMENT OF A LOW-LEVEL RADIOACTIVE GAS TRACER SYSTEM FOR NATURAL GAS OPERATIONS

F. E. ARMSTRONG, G. E. FLETCHER
W. D. HOWELL

INT-BM-6-4179-1100
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 869 FIELD 7D, 8D, 8H, 7B

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

DETERMINATION, CORRELATION, AND INTERPRETATION OF ORGANIC CONSTITUENTS IN SUBSURFACE BRINES

A. G. COLLINS

INT-BM-6-1112-11A0C
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 876 FIELD 7D,21D, 8D,20J

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

PETROLEUM COMPOSITION RESEARCH APPLIED TO PETROLEUM PRODUCTION

C. W. DWIGGINS, D. A. DOUGHTY
R. J. HEEMSTRA, K. WILLCOX

INT-BM-6-1112-11A02
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 878 FIELD 8D, 8G,11B

USDI, BUR MINES, TUSCALOOSA, ALABAMA

CLAY EVALUATION

F. J. CSERVENYAK, I. L. FELD, H. P. LEVAN
R. J. LILES, M. E. TYRRELL

INT-BM-112611-4
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 879 FIELD 7D, 8D, 8G, 7B

USDI, BUR MINES, TUSCALOOSA, ALABAMA

PHOSPHATE WASHER SAND FLOTATION

F. J. CSERVENYAK, I. L. FELD, M. GREEN
W. E. LAMONT

INT-BM-111471-5
/66- /

INTERIOR-BUREAU OF MINES

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ZYA 24445 FIELD 13B, 8H

USDA, DC, DIST OF COLUMBIA

SOIL WETTABILITY AND TREATMENT IN RELATION TO WATER MOVEMENT

C. E. HOLSCHER

AG-FS-01-06-040
/66- /

AGRICULTURE-DEPT OF AGRICULTURE

09 ELECTRONICS AND ELECTRICAL ENGINEERING

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GQF 34 9 FIELD 9+, 9A,20J,20F

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

SOURCE-DETECTOR STUDIES IN THE SUBMILLIMETER REGION

P. D. COLEMAN

AF-AFOSR-0272-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 359 9 FIELD 9+, 9A,12A, 9D

POLYTECH INST BROOKLYN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

MICROWAVES ELECTROMAGNETIC THEORY AND INFORMATION PROCESSES

E. WEBER

AF-49-638-01402
/65- /

DOD-AIR FORCE

••••••••••

GQF 207555 FIELD 9+, 9A,20F,20I

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

FAST ELECTONIC AND ELECTRO-OPTICAL TECHNIQUES

P. BLETZINGER

/65- /

DOD-AIR FORCE

••••••••••

GQF 258055 FIELD 8+, 9+, 9A

MASS INST OF TECHNOL, GRADUATE SCHOOL, METEOROLOGY, MASSACHUSETTS

STUDY OF PROPERTIES OF BEAD + ROD THERMISTORS AT LOW DENSITIES AND UNDER VARIOUS R

D. P. KEILY

AF-19-628-04165
/65- /

DOD-AIR FORCE

••••••••••

GQF 258207 1 FIELD 12A,20H

WENTWORTH INST., BOS, MASSACHUSETTS

DATA PROCESSING + ANALYSIS + EVALUATION OF PRESENT + IMPROVED DATA HANDLING PROCEDURES

M. J. DAVIN

AF-19-628-04083
/65- /

DOD-AIR FORCE

••••••••••

GQF 258935 FIELD 12A

BOLT, BERANEK + NEWM, ., MASSACHUSETTS

DESIGN AND DEMONSTRATE SYSTEM FOR ADVANCED COMPUTER PROGRAMING - NATURAL LANGUAGE COMPUTER PROGRAM

NONE

AF-19-628-05065
/65- /

DOD-AIR FORCE

••••••••••

GQF 259040 FIELD 9+,12A,20L, 7B

EFFORT FOR DESIGN CONSTR ANALOG OPTICAL MATRIX MANIPULATOR UNDER CONTROL OF A DIGITAL COMPUTER

. NONE

AF-19-628-04311
/65- /

DOD-AIR FORCE

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GQF 284970 FIELD 9+,20F,20I

ROYAL INST OF TECHNOL, SWEDEN

GENERATION AND AMPLIFICATION OF MICROWAVES BY INTERACTION OF ELECTRON BEAMS AND PLASMA

A. BERTIL

AF-61-052-00895
/65- /

DOD-AIR FORCE

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GSE 871 FIELD 9+, 9A,20F,20L

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

ANTIFERROMAGNETIC MATERIALS FOR MILLIMETER AND SUBMILLIMETER DEVICES

G. S. HELLER, A. WOLD

NSF-GK-437
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

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NG 99 FIELD 12A, 5C

PURDUE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, INDIANA

PROBLEMS OF CONTROL AND PROGRAMMING

L. BERKOVITZ, D. SABBACH

7/65- 6/66

PURDUE UNIVERSITY

••••••••••

NIL 182 FIELD 6B, 9C, 9+

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, SOCIOLOGY, ILLINOIS

ELECTRONIC MUSIC

D. J. BORDUA

2/65- 6/66

ILLINOIS, UNIVERSITY OF

•••••••••

ZBF 24 FIELD 9+,12A

USDC, BUR OF CENSUS, MARYLAND

FOSDIC DEVELOPMENT

M. ANDERSON

/66- /

COMMERCE-BUREAU OF CENSUS

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ZBF 25 FIELD 12A

USDC, BUR OF CENSUS, MARYLAND

PROGRAMMING AIDS

D. P. ARMSTRONG

/66- /

COMMERCE-BUREAU OF CENSUS

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ZQF 260038 FIELD 9+,20F,20J

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ELECTROMAGNETIC NETWORKS AND FIELDS

E. J. POST

/65- /

DOD-AIR FORCE

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ZQN 544137 FIELD 9+, 9C, 9A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

POWER SYSTEMS SWITCHING

H. H. KASIHARA

/65- /

DOD-NAVY

•••••••••

ZT 40 4 FIELD 9+, 9C

TENN VALLEY AUTHORITY, TENNESSEE

USE OF VOLTAGE PHASE ANGLES FOR INCREMENTAL TRANSMISSION LOSS DETERMINATIONS

J. H. GILBREATH, J. R. HUFF

/66- /

TENNESSEE VALLEY AUTHORITY

•••••••••

ZT 48 4 FIELD 9C, 9+

TENN VALLEY AUTHORITY, TENNESSEE

SHORT-TERM (24HOUR) ELECTRICAL LOAD PREDICTIONS

C. J. POWELL

/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 85 2 FIELD 9+, 9C

TENN VALLEY AUTHORITY, TENNESSEE

ESTIMATES OF DISTRIBUTION TRANSFORMER AND CIRCUIT LOADS FROM CONSUMER ENERGY USE

W. R. NEW

/66- /

TENNESSEE VALLEY AUTHORITY

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ZUA 643 3 FIELD 13G,13B, 9+,12A

USDI, GEOL SURV PHEONX, ARIZONA

DEVELOPMENTS IN ELECTRIC ANALOGS

H. E. SKIBITZKE, R. H. BROWN
G. M. ROBINSON

INT-GS-RMA-109-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

10 ENERGY CONVERSION (NON-PROPULSIVE)

•••••••••

GQA 300 1 FIELD 9C,20F,20L, 7B

THERMIONIC ENERGY CONVERSION

R. E. STICKNEY, E. N. CARABATEAS

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

•••••••••

GQF 258794 1 FIELD 7C, 7D,20M,20F

NORTHEASTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

RESEARCH ON METHODS AND TECHNIQUES OF SOLAR ENERGY CONVERSION

M. W. ESSIGMANN

AF-19-628-03836
/65- /

DOD-AIR FORCE

•••••••••

GSE 795 1 FIELD 9C,10B,20L

UNIV OF ROCHESTER, SCHOOL OF ENGINEERING, AEROSPACE + MECH SCI, NEW YORK

CONVERSION OF HEAT INTO ALTERNATING CURRENT

H. S. DUNN

NSF-GK-178
3/66- 3/67

NSF-ENGINEERING SCIENCES DIVISION

•••••••••

GSE 868 . FIELD 11C,20L

WASHINGTON STATE UNIV, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WASHINGTON

PIEZOELECTRIC EFFECT IN WOOD

W. L. GALLIGAN, J. A. SMETANA

NSF-GK-435
6/65- 6/66

NSF-ENGINEERING SCIENCES DIVISION

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NG 96 FIELD 9+, 9C, 9A

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, INDIANA

A P-I-N PHOTOVOLTAIC DEVICE FOR STATIC ENERGY CONVERSION

R. J. SCHWARTZ, C. W. KIM

7/65- 6/66

PURDUE UNIVERSITY

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ZQN 544219 FIELD 7C, 7D,21I, 9C

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SEA WATER BATTERY

R. D. HITCHCOCK, D. B. CLARK

/65- /

DOD-NAVY

•••••••••

ZUF 271 FIELD 7D,20D,10B

USDI, BUR RECLAM, DENVER, COLORADO

HIGH-HEAD TURBINE FLOW MEASUREMENTS--SELECTION OF RADIOISOTOPES

R. L. HANSEN, G. H. MCCORMICK

/66- /

INTERIOR-BUREAU OF RECLAMATION

11 MATERIALS

•••••••••

GPF 714 3 FIELD 7C, 7D,11G,11F

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

THE OXIDATION OF THIN SINGLE CRYSTALS OF COPPER

L. O. BROCKWAY

AT(11-1)-1086
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

•••••••••

GPF 726 3 FIELD 7D,20M,11F,11G

UNIV OF VT + ST AGRIC, GRADUATE SCHOOL, CHEMISTRY, VERMONT

ABSORPTION OF HYDROGEN AND DEUTERIUM BY PALLADIUM-RICH ALLOYS

T. B. FLANAGAN, K. ALLARD, D. CHISDES
M. LEPRADE, A. MAELAND, J. W. SIMONS

AT-30-1-3000
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

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GPF 760 4 FIELD 7C, 7D,11B,20L

UNIVERSITY OF UTAH, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, UTAH

RECRYSTALLIZATION AND SINTERING OF OXIDES

I. B. CUTLER

AT(11-1)-1122
12/65-11/66

AEC-DIVISION OF PHYSICAL RES

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GQA 189 FIELD 7C, 7D,20M,11G

THIOKOL CHEM. CORP.,, NEW JERSEY

CARBORANE - SILICONE ELASTOMERS

J. GREEN

DA-11-070-AMC-852W
/65- /

DOD-ARMY

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GQA 193 2 FIELD 7C, 7D, 5A,11H

WYANDOTTE CHEM. CORP, MICHIGAN

LOW TEMPERATURE OIL RESISTANT POLYURETHANE RUBBERS

S. L. AXELROOD

DA-20-018-ORD-24883
/65- /

DOD-ARMY

****

GQA 434 1 FIELD 13H,11G

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, CALIFORNIA

STUDY OF THE NOTCHED-BAR CREEP-RUPTURE TEST

I. FINNIE

DA-ARO-D-31-124-G551
/65- /

DOD-ARMY

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GQA 465 1 FIELD 11B

AVCO MFG CORP WILMIN, MASSACHUSETTS

EFFECT OF PROCESSING ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF POLYCRYSTALLINE CERAMICS PREPARED BY HIGH PRESSURES

T. VASILOS

DA-31-124-ARO-D-168
/65- /

DOD-ARMY

****

GQF 3989 FIELD 5A,11G,20F,20L

INST OF OPTICS PARIS, FRANCE

INTERNATIONAL CONFERENCE ON THE OPTICAL PROPERTIES OF METALS AND ALLOYS

F. ABELES

AF-EOAR-0028-65
/65- /

DOD-AIR FORCE

****

GQF 4350 FIELD 11F,13H,11G,20L

BATTELLE MEMORIAL IN, OHIO

EFFECTS OF HIGH STRAIN RATES ON THE FLOW STRESS + DEFECT STRUCTURE OF METALS

J. EDINGTON

AF-AFOSR-0867-65
/65- /

DOD-AIR FORCE

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GQF 6759 1 FIELD 11F,11G,20L, 7B

BENDIX CORP, RES LABS, DIV, SOUTHFIELD-DETROI, MICHIGAN

TRANSPORT PROPERTIES IN GRAIN BOUNDARIES

R. K. MUELLER

AF-49-638-01378
/65- /

DOD-AIR FORCE

****

GQF 207506 FIELD 11G,12A,20H,20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

FATIGUE BEHAVIOR IN METALS

H. LIPSITT

/65- /

DOD-AIR FORCE

****

GQF 258397 2 FIELD 20M,11F,13H,20L

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, NEW YORK

EFFORT ON PREP + PURIFICATION OF SELECTED ORGANIC + INORGANIC MATS TO OBTAIN HIGH PURITY ELEC MATS

W. BRENNER

AF-19-628-02359
/65- /

DOD-AIR FORCE

****

GQF 258400 4 FIELD 7D,20L, 7B

WENTWORTH INST., BOS, MASSACHUSETTS

TECHNIQUES FOR THE PREPARATION ULTRA-PURIFICATION AND EVALUATION OF INORGANIC ELECTRONIC MATERIALS

M. J. DAVIN

AF-19-604-08503
/65- /

DOD-AIR FORCE

****

GQF 284965 FIELD 11D,11F,11G

THOMPSON-RAMO-WOOLDR, IO, OHIO

EXPLORATORY INVESTIGATION OF TIME DEPENDENT MECHANICAL BEHAVIOR OF COMPOSITE MATERIALS

E. A. STEIGERWALD

AF-33-615-03062
/65- /

DOD-AIR FORCE

****

GR 78 FIELD 11A,11G

BATTELLE MEMORIAL IN, OHIO

ADHESIVE BONDED STRUCTURAL COMPONENTS

. NONE

2-29
/65- /

HOUSING AND HOME FINANCE AGENCY

****

GSE 608 1 FIELD 11B,20L,10B

LEHIGH UNIVERSITY, SCHOOL OF ENGINEERING, INDUSTRIAL ENGINEERING, PENNSYLVANIA

DEFORMATION BEHAVIOR OF SINTERED CARBIDES UNDER HIGH STRESS AND ELEVATED TEMPERATURES

G. E. KANE, J. D. WOOD

NSF-GK-46
9/65- 9/66

NSF-ENGINEERING SCIENCES DIVISION

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GSE 891 FIELD 13H,11G

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MICHIGAN

ACOUSTIC EMISSION FROM METALS

J. R. FREDERICK

NSF-GK-697
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

****

GYE 330134 FIELD 7C, 7D,11C

PREPARATION AND EVALUATION OF SELECTED LINSEED OIL DERIVATIVES FOR USE IN PROTECTIVE COATINGS

A. E. RHEINECK

AGF-NO4-02-110
9/65- 8/66

AGRICULTURE-DEPT OF AGRICULTURE

****

JCG 1 FIELD 11B,20L, 7B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

VARIABLES APPLICABLE TO THE PREPARATION OF BATIO3

R. L. COOK, R. L. BOLTON, F. E. RICHTER

/65- /

CHICAGO COPPER + CHEMICAL COMPANY

****

JHL 1 FIELD 11B,20F,20L, 7B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

STRUCTURAL CHARACTERISTICS OF HIGH LEAD GLASSES

R. L. COOK, R. J. SMID

/65- /

HAMMOND LEAD PROJECTS

****

JPI 1 FIELD 20M,11B,20L, 7B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

ENTHALPY CHANGES ACCOMPANYING THE GROWTH AND DISSOLUTION OF CRYSTALS IN GLASSES

C. G. BERGERON, D. LABER

/65- /

PITTSBURGH PLATE GLASS COMPANY

****

JSS 1 FIELD 13G,11B,11C,11F

UTAH ST UNIV OF AGRIC, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, UTAH

DEFLECTION OF CEMENT MORTAR-LINED AND CEMENT MORTAR-COATED STEEL PIPE WITH NO

INTERNAL PRESSURE BURIED IN SOIL

R. K. WATKINS, D. LOOSLE, A. B. SMITH

6/65- 9/65

SMITH SCOTT COMPANY

****

PCS 430 FIELD 11H,11G

VISCOELASTIC AND NON-NEWTONIAN PHENOMENA IN POLYMERIC AND OTHER MATERIALS

M. C. WILLIAMS

520-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 431 FIELD 7C, 7A, 7D

EFFECT OF ULTRAVIOLET RADIATION ON THE STRESS RELAXATION OF SULFUR-CONTAINING POLYMERS

W. J. MACKNIGHT

522-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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POE 1 FIELD 7A, 7D,20M,11B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

DIELECTRIC AND STRUCTURAL INVESTIGATIONS OF THE BATIO3-BAHFO3 SYSTEMS

V. J. TENNERY, W. H. PAYNE

/65- /

ORTON, EDWARD JR CERAMIC FOUNDATION

****

ZQA 23 FIELD 11B,11D,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

HIGH TEMPERATURE VAPORIZATION

I. AHMAD

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 28 FIELD 7C, 7D, 5A,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

DIFFUSION OF CARBON IN IRON

C. HOMAN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 33 FIELD 7C, 7A, 7D,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

SURFACE PROPERTIES AND BEHAVIOR OF MATERIALS

F. SAEGUSA

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 37 FIELD 11B,11D,11G,20L

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

FATIGUE-RUPTURE CHARACTERISTICS OF FIBER-GLASS THIN-WALLED CYLINDERS

T. DAVIDSON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 43 FIELD 5A,11F,11G,20L

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

EXPERIMENTAL ANALYSIS OF THREADS

R. LASSELLE

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 152 FIELD 11B

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE CERAMICSYSTEMS

A. TARPINIAN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 153 FIELD 7D, 7A,11B, 7B

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

GAS SOLUBILITY IN SOLID AND LIQUID CERAMIC

S. J. ACQUAVIVA

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 155 FIELD 11B

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

INVESTIGATION OF HOT FORMING TECHNIQUES FOR CERAMIC MATERIALS

K. D. HOLMES

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 156 FIELD 11B

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

CORRELATION OF MICROSTRUCTURE WITH MECHANICAL PROPERTIES OF PYROLYTIC GRAPHITE

R. N. KATZ

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 174 FIELD 11F,13H,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

PRECIPITATION PHENOMENA IN IRON ALLOY SYSTEMS

L. MEISEL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 181 FIELD 7D,11G,11C, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INNOVATIONS IN PHOSPHATIZING TECHNIQUES

J. DOSS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 185 FIELD 11B,11G,11D,11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATION OF FIBROUS MATERIALS FOR REINFORCEMENT OF RUBBER ITEMS

D. SALE

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 186 FIELD 7C, 7D,20M,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

CORRELATION OF POLYMER STRUCTURE WITH PHYSICAL PROPERTIES

J. W. MCGARVEY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 191 FIELD 11G,11C

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

COATED FABRICS HEAT SEALABLE AND WIDE RANGE TEMPERATURE FLEXIBILITY

A. C. SAUNDERS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 192 FIELD 13H,11D,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF COMPOSITE TRANSPARENT PLASTIC FILMS

L. LYNCH

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

12 MATHEMATICAL SCIENCES

••••••••••

GQF 505 7 FIELD 12A

UNIVERSITY OF LIEGE, BELGIUM

HYPERBOLIC AND ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS

F. J. BUREAU

AF-61-052-00612
/65- /

DOD-AIR FORCE

••••••••••

GQF 508 9 FIELD 12A

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, MATHEMATICS, ILLINOIS

ALGEBRAIC MECHANISM OF FIBER SPACES

S. MACLANE

AF-AFOSR-0520-64
/65- /

DOD-AIR FORCE

••••••••••

GQF 772 6 FIELD 12A

SYRACUSE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

THEORY OF APPROXIMATION

G. G. LORENTZ

AF-49-638-01401
/65- /

DOD-AIR FORCE

••••••••••

GQF 3284 3 FIELD 12A,20H,20J

ISR INST OF TECHNOLOGY, ISRAEL

THE PHYSICAL TENSOR ANALYSIS AND APPLICATION

Z. KARNI

AF-EOAR-0071-64
/65- /

DOD-AIR FORCE

••••••••••

GQF 4374 FIELD 12A, 8E,13M,20D

UNIVERSITY OF MARYLAND, SCHOOL OF ENGINEERING, FLUID DYNAM + AP MATH, MARYLAND

SYMPOSIUM ON THE NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

B. E. HUBBARD

AF-AFOSR-0836-65
/65- /

DOD-AIR FORCE

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GQF 6871 1 FIELD 12A,13M,20H,20D

STANFORD UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

CLASSICAL AND APPLIED ANALYSIS

D. GILBARG

AF-49-638-01345
/65- /

DOD-AIR FORCE

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GQF 207312 7 FIELD 12A,20H,20F,20J

RESEARCH ON RIEMANNIAN SPACES

V. HLAVATY

AF-33-657-11550
/65- /

DOD-AIR FORCE

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GQF 207548 FIELD 7C, 7D,12A,20H

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ALGEBRAIC GROUP THEORY

D. BARNETT

/65- /

DOD-AIR FORCE

••••••••••

GQF 207565 FIELD 12A,20H,20F,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDY OF THE EQUATIONS OF MOTION IN GENERAL RELATIVITY

L. TAMBURINO

/65- /

DOD-AIR FORCE

••••••••••

NG 86 FIELD 12A

NUMERICAL SOLUTION OF TWO POINT BOUNDARY VALUE PROBLEMS

S. D. CONTE, D. KERR

6/64- 6/65

PURDUE UNIVERSITY

••••••••••

ZBF 36 FIELD 12A, 5C

USDC, BUR OF CENSUS, MARYLAND

THE DISTRIBUTION OF RATIO ESTIMATES

B. I. TEPPING

/66- /

COMMERCE-BUREAU OF CENSUS

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

••••••••••

7GX 1163 3 FIELD 13B, 8H

UNIV OF NORTH CAROLINA, SCHOOL OF PUBLIC HLTH, SANITARY ENGINEERING, NORTH CAROLINA

DESIGN CRITERIA FOR FINAL TANKS AND SLUDGE THICKENERS

J. C. LAMB

7-WP-00569-03
3/66- 2/67

PHS-BSS

••••••••••

7GX 1247 2 FIELD 13B

ILLINOIS INST OF TECH, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

FOAM SEPARATION - FLOTATION OF COLLOID-ORGANIC SYSTEMS

R. B. GRIEVES, C. F. GURNHAM

ESE (7WP-00702-02)
1/66-12/66

PHS-BSS

••••••••••

7GX 1564 2 FIELD 7D,20D,10B

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, GEORGIA

AIR CLEANING BY HIGH SPEED INERTIAL IMPACTION

C. ORR, J. H. BURSON

7-AP-00373-02
10/65- 9/66

PHS-BSS

••••••••••

7GX 1645 5 FIELD 13B,12A

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, SANITARY ENGINEERING, NEW YORK

APPLICATION OF SECOND ORDER REACTION

V. C. BEHN, P. MONADJEMI

7-WP-00234-05
9/65- 8/66

PHS-BSS

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7GX 3758 1 FIELD 13B,20D

IOWA ST UNIV SCI TECH, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, IOWA

EMPIRICAL PREDICTION OF SAND FILTER PERFORMANCE

J. L. CLEASBY

7-EF-00835-01
3/66- 2/67

PHS-BSS

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GQF 550194 3 FIELD 13B,11G,20L

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, INDIANA

EXPERIMENTAL STUDY OF SOIL WALL SHEAR

G. A. LEONARDS

AF-29-601-05204
/65- /

DOD-AIR FORCE

••••••••••

GR 77 FIELD 21B,10B

NATL ACAD SCI NAT RE, DIST OF COLUMBIA

EVALUATION OF A PROPOSED FLAME SPREAD TEST PROCEDURE FOR HEATING AND AIR CONDITIONING DUCTS

• NONE

1-32
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 88

STUDY OF DOMESTIC WATER DEMANDS

• NONE

4-44
/65-

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 88 FIELD 20D

USDC, NATL BUR STAN, DIST OF COLUMBIA

CONTROL OF AIR-BORNE NOISE THROUGH WALLS, FLOORS, AND DOORS IN MULTIFAMILY DWELLINGS

• NONE

6-34
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 89 FIELD 20D

USDC, NATL BUR STAN, DIST OF COLUMBIA

CONTROL OF STRUCTURE-BORNE NOISE IN MULTIFAMILY DWELLINGS

• NONE

6-35
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 90

INTENSITY OF DEVELOPMENT AND LIVABILITY OF MULTI-FAMILY AND SINGLE-FAMILY - I NCLUDING MOBILE HOMES DWELLINGS

• NONE

7-16
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 91 FIELD 21B

FIRE PROTECTION IN HOUSING FOR THE ELDERLY AND NURSING HOMES

• NONE

7-15
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GSE 786 1 FIELD 13B

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, WASHINGTON

SYSTEMS ANALYSIS OF WATER AND WASTE TREATMENT PROCESSES

R. H. BOGAN, R. N. CLARK

NSF-GK-180
3/66- 3/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GSE 910 FIELD 13B,20D,20K

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, MICHIGAN

WAVE FORCES ON SUBMERGED STRUCTURES

E. F. BRATER

NSF-GK-747
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

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GSE 915 FIELD 13B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

AUXILIARY DATA IN SPATIAL AEROTRIANGULATION

M. M. KARARA

NSF-GK-776
2/66- 2/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GUW 414 FIELD 13G

KANSAS ST UNIV AGR SCI, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, KANSAS

A STUDY OF ENERGY DISSIPATION DEVICES TO CONTROL EROSION

R. M. HAYNIE

INT-WR-A-009-KAN
9/65- 8/66

INTERIOR-OFFICE OF WATER RESOURCES

••••••••••

GYE 290162 FIELD 12A, 8E, 7B

RUTGERS THE STATE UNIV, AGRICULTURAL EXPT STA, METEOROLOGY, NEW JERSEY

THE RELATIONSHIPS BETWEEN THE CONCENTRATIONS OF CERTAIN AIR POLLUTANTS AND VARIOUS METEOROLOGICAL FACTORS

A. V. HAVENS

AG-NJ-0279
7/64- 6/65

AGRICULTURE-DEPT OF AGRICULTURE

••••••••••

NIL 80 FIELD 13+, 9C,12A,13M

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MECHANICAL + IND ENGIN, ILLINOIS

SYNTHESIS OF AN ELECTRO-HYDRAULIC CONSTANT FORCE GENERATOR OF LOW AND MEDIUM FREQUENCY OPERATING RANGE

B. F. VONTURKOVICH, B. K. CHAO

/65- /

ILLINOIS, UNIVERSITY OF

••••••••••

NIL 178 FIELD 13G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

SCOUR PROTECTION FOR CULVERT OUTLETS

M. B. MCPHERSON, D. D. MEREDITH

/65- /

ILLINOIS, UNIVERSITY OF

••••••••••

YAR 47 FIELD 13G,13B, 8H,11B

UNIVERSITY OF ARIZONA, AGRICULTURAL EXPT STA, WATERSHED MANAGEMENT, ARIZONA

SELECTION AND TESTING OF MATERIALS FOR SURFACING WATERSHED AREAS

M. M. FOGEL, C. B. CLUFF, L. G. WILSON

/65- /

STATE-ARIZONA

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YCO 120 FIELD 13G

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

ARTIFICIAL GROUND WATER RECHARGE FACILITY STUDY ON ARICKAREE RIVER

R. LONGENBAUGH

7/65- 6/66

STATE-COLORADO

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ZQA 189 FIELD 11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

EVAL MECH CLOSURES IN COMPARISON WITH FUSIN CLOSURES IN TRANSPARENT PACKAGES

G. F. MARTIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 190 FIELD 11G,11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATE ADAPTABILITY OF HEAT SHRINKABLE FILMSFOR TRANSPARENT PACKAGES

R. MURRENS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZQN 530479 4 FIELD 13J, 8H,12A,22C

WAVE HINDCAST PROJECT-DECK MOTION STUDIES

D. C. LINDQUIST

/65- /

DOD-NAVY

••••••••••

ZQN 544096 FIELD 13F,11B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

INVESTIGATION OF LAYERED PAVEMENT SYSTEMS

J. P. NIELSEN, J. A. BISHOP

/65- /

DOD-NAVY

••••••••••

ZQN 544115 1 FIELD 13J,13G, 8H,15+

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ELECTRICAL FIELD BARRIER FOR MARINE LIFE

T. ROE, W. S. HAYNES

/65- /

DOD-NAVY

•••••••••

ZQN 544127 5 FIELD 7D,20M

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

INVESTIGATION OF BOILING HEAT TRANSFER IN VAPOR COMPRESSION STILLS

E. J. BECK

/65- /

DOD-NAVY

•••••••••

ZQN 544152 2 FIELD 11B, 5A,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

LONG RANGE OBSERVATIONS-PRESTRESSED CONCRETE BEAMS + PRESTRESSED RIGID-FRAME BLDG.

R. BRECKENRIDGE, W. A. SHAW

/65- /

DOD-NAVY

•••••••••

ZQN 544157 1 FIELD 11B,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

PNEUMATICALLY PLACED MORTAR AND CONCRETE

W. R. LORMAN, D. F. GRIFFIN

/65- /

DOD-NAVY

•••••••••

ZQN 544220 2 FIELD 13J, 8H, 8+, 9+

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

IMPROVED UNDERWATER ILLUMINATION

R. D. HITCHCOCK, D. B. CLARK

/65- /

DOD-NAVY

•••••••••

ZT 80 4 FIELD 13G, 8H, 9C, 9+

TENN VALLEY AUTHORITY, TENNESSEE

WATER DISPATCHING OPERATIONS BY IBM 704 COMPUTER

• NONE

/66- /

TENNESSEE VALLEY AUTHORITY

•••••••••

ZT 87 2 FIELD 11F,11G,20K,10B

TENN VALLEY AUTHORITY, TENNESSEE

STUDY OF CREEP CHARACTERISTICS OF T-11 AND T-22 BOILER TUBING AND P-11 AND P-22 MAIN AND REHEAT STEAM PIPING

• NONE

/66- /

TENNESSEE VALLEY AUTHORITY

•••••••••

ZT 96 2 FIELD 13A, 4B

TENN VALLEY AUTHORITY, TENNESSEE

FULL-SCALE FIELD STUDY OF PLUME RISE AT LARGE ELECTRIC GENERATING STATIONS

F. E. GARTRELL, S. B. CARPENTER
F. W. THOMAS

TV-24649A
/66- /

TENNESSEE VALLEY AUTHORITY

•••••••••

ZT 108 2 FIELD 20D,10B

TENN VALLEY AUTHORITY, TENNESSEE

STUDIES OF BEND LOSSES AND VANING IN LARGE CONDUITS

• NONE

/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 121 1 FIELD 13G,13B

TENN VALLEY AUTHORITY, TENNESSEE

EFFECTS OF POLLUTION ON WATER USES

M. A. CHURCHILL

/66- /

TENNESSEE VALLEY AUTHORITY

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ZUA 842 FIELD 13G,13F, 8F, 8K

SCOUR AT BRIDGE CROSSINGS IN ALASKA

L. S. LEVEEN

INT-GS-ALSK-36-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUA 853 FIELD 13B, 8H

SEWAGE LAGOON STUDY

W. J. POWELL

INT-GS-ALA-22-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

•••••••••

ZUF 272 FIELD 8G, 8D

USDI, BUR RECLAM, DENVER, COLORADO

INSTALLATION OF TUNNEL SET LOAD CELLS IN DIVIDE TUNNEL, COLORADO
E. J. SLEGER, L. A. BROWN, J. REED

DR-232
/66- /

INTERIOR-BUREAU OF RECLAMATION

•••••••••

ZUG 803 FIELD 19D,21D, 7D, 8C

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

SUPPRESSION OF COAL DUST AT SOURCE BY USE OF FOAM

F. G. ANDERSON

INT-BMHS-20-14
/66- /

INTERIOR-BUREAU OF MINES

•••••••••

ZUG 809 FIELD 13G, 8H,11A

USDI, BUR MINES, S.L.C., UTAH

CHEMICAL SEALANTS TO REDUCE SEEPAGE IN WATER STORAGE AREAS

B. H. CLEMMONS, W. W. AGEY, G. M. POTTER

INT-BM-111461-12
/66- /

INTERIOR-BUREAU OF MINES

•••••••••

ZUG 859 FIELD 7D,21D, 6B, 7A

USDI, BUR MINES, DIST OF COLUMBIA

CONTINUOUS RECORDING X-RAY ASH METER

W. H. OPPELT, A. W. DEURBROUCK, J. HUDY

INT-BM-11114111-3
/66- /

INTERIOR-BUREAU OF MINES

•••••••••

ZUG 873 FIELD 7C, 7D

USDI, BUR MINES, TUSCALOOSA, ALABAMA

APPLICATION OF DYES AND SURFACE ACTIVE ORGANIC COMPOUNDS TO THE FLOTATION OF INDUSTRIAL MINERALS

F. J. CSERVENYAK, J. S. BROWNING
A. G. SMELLEY

INT-BM-111471-7
/66- /

INTERIOR-BUREAU OF MINES

•••••••••

ZUG 874 FIELD 7C, 7D, 7B

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

PROCEDURES AND METHODOLOGY APPROPRIATE FOR INSTRUMENTAL DETERMINATION OF HYDROCARBONS AND NITROGEN OXIDES IN AUTOMOTIVE EXHAUST

B. DIMITRIADES, J. W. VOGH

INT-BM-13-8PR-65-16
/66- /

INTERIOR-BUREAU OF MINES

•••••••••

ZUG 875 FIELD 13A,13F, 7A, 7D

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

CHARACTERISTICS AND PHOTOCHEMICAL REACTIVITY OF VEHICULAR EMISSIONS

B. DIMITRIADES, J. D. CLINGENPEEL
R. D. FLEMING, J. E. SHAFER

INT-BM-6-4211-1100
/66- /

INTERIOR-BUREAU OF MINES

14 METHODS AND EQUIPMENT

•••••••••

GH 1421 1 FIELD 20M,20D

UNIV OF NORTH DAKOTA, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, NORTH DAKOTA

TIME-TEMPERATURE CHARACTERISTICS OF THIN-SKINNED MODELS AS AFFECTED BY THERMOCOUPLE VARIABLES

A. B. LARSON, E. NELSON

NGR-35-002-003
10/65-10/66

NASA

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GQF 259641 FIELD 22A, 9C,15+, 9+

BOSTON COLLEGE, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

DEVELOP AND CALIBRATE FILM SPECTRO METERS AND RADIOMETERS FOR USE ON REENTRY VEHICLES

J. J. DEVLIN

AF-19-628-04305
/65- /

DOD-AIR FORCE

****

GSP 2174 FIELD 8D, 7B

CAL INST OF TECHNOLOGY, GRADUATE SCHOOL, GEOLOGICAL SCIENCES, CALIFORNIA

CONSTRUCTION OF A MASS SPECTROMETER FOR OXYGEN AND CARBON ISOTOPE ANALYSES

H. P. TAYLOR, S. EPSTEIN

NSF-GP-4378
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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ZQF 260056 FIELD 22C, 7D, 4A,20C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

LABORATORY COMPOSITION STUDIES

R. S. NARCISI

/65- /

DOD-AIR FORCE

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ZQF 284814 FIELD 20L,20D,20I

USAF, AF ACADEMY, ACADEMY, COLORADO

LOW DENSITY SHOCK TUBE SUPPORT

C. F. STEBBINS

/65- /

DOD-AIR FORCE

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ZQN 544175 1 FIELD 13J, 7C, 7D, 8H

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SIMULATED DEEP OCEAN ENVIRONMENTAL LABORATORY

J. D. STACHIW, K. O. GRAY

/65- /

DOD-NAVY

****

ZUG 882 FIELD 7D,12A, 7B

USDI, BUR MINES, COLLEGE PK, MARYLAND

X-RAY AND ELECTRON OPTICAL ANALYTICAL METHODS

F. D. LAMB, J. D. BROWN, W. J. CAMPBELL

INT-BM-111421-10
/66- /

INTERIOR-BUREAU OF MINES

15 MILITARY SCIENCES

****

SV 176 FIELD 12A,15C,15G

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

STUDY OF COMPUTER SIMULATION OF ARMED COMBAT

S. L. RABIN, G. W. EVANS, S. +. RABIN

9/65- 8/66

SOCIAL SCIENCE RES COUNCIL

16 MISSILE TECHNOLOGY

****

GQF 259007 FIELD 11G

NORTHEASTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

RESEARCH DEVELOPMENT MODIFICATION FABRICATION INSTALLATION + TESTING ROCKET PROBE COMPONENTS

J. S. ROCHEFORT

AF-19-628-05140
/65- /

DOD-AIR FORCE

17 NAVIGATION, COMMUNICATIONS DETECTION AND COUNTERMEASURES

****

GH 818 2 FIELD 9+,20I

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

STUDY OF PLASMA SHEATH ASSOCIATED WITH COMMUNICATIONS BLACKOUT

R. E. HIATT

NSG-472
6/65- 5/66

NASA

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GSS 1297 FIELD 9+

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

THE HISTORY OF RADAR

C. SUSSKIND

NSF-GS-952
8/65- 8/66

NSF-SOCIAL SCIENCES DIVISION

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ZQF 284919 2 FIELD 17G, 4A,12A,22C

USAF, AFSC, KIRTLAND AFB, NEW MEXICO

THEORETICAL ANALYSIS AND CALCULATIONAL STUDIES

R. STOVALL

/65- /

DOD-AIR FORCE

18 NUCLEAR SCIENCE AND TECHNOLOGY

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7ZX 4039 1 FIELD 12A, 5A,18A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

BETA SPECTROSCOPY WITH LITHIUM-DRIFTED SEMICONDUCTOR DETECTORS

V. J. SOOD

BSS-415-07-5
7/65- 6/66

PHS-BSS

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ZPE 1439 FIELD 7C, 7D,20M, 8H

IMPROVED TRITIUM INSTRUMENTATION

J. E. HOY

/66- /

AEC-BIOLOGY + MEDICINE

****

ZPE 1531 FIELD 12A,18A, 7B

THE HALF-LIFE OF THORON

J. B. HURSH

W-7401-ENG-4
/66- /

AEC-BIOLOGY + MEDICINE

****

ZQN 544151 FIELD 7D, 7A,11B,11G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

RESEARCH APPLICATIONS OF RADIOISOTOPE TECHNIQUES AT NCEL

C. M. HUDDLESTON, W. B. PLUM

/65- /

DOD-NAVY

19 ORDNANCE

****

ZQA 177 1 FIELD 11G,15G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

COMPONENT IMPROVEMENT AND STUDY OF NEW CANNON ANDGUN LAUNCHER PRINCIPLES

W. H. AUSTIN, W. E. CONNOLLY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 228 FIELD 12A,15C,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATION OF RECOIL SYSTEM SENSITIVITY TO PARAMETER VARIATIONS

T. STREETER

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZUG 885 FIELD 7C,19D,21B

PERFORMANCE OF RDX IN LINEAR SHAPED CHARGES

C. M. MASON, D. R. FORSHEY, E. J. MURPHY T. C. RUHE

INT-BM-5352
/66- /

INTERIOR-BUREAU OF MINES

••••••••••

ZUG 886 FIELD 7D,19D

ANALYTICAL RESEARCH

C. M. MASON, E. C. LISOTTO, E. J. MURPHY

INT-BM-111711-N
/66- /

INTERIOR-BUREAU OF MINES

20 PHYSICS

••••••••••

7GX 3562 1 FIELD 20D

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, GEORGIA

DIFFUSIVITY OF PARTICLES IN A TURBULENT FIELD

M. R. CARSTENS

7-WP-00912-01
1/66-12/66

PHS-BSS

••••••••••

7GX 3563 1 FIELD 13B, 8H

THE ROLE OF MIXING IN MAINTAINING STRATIFIED FLOW

E. SILBERMAN, H. STEFAN

7-WP-00913-01
1/66-12/66

PHS-BSS

••••••••••

GH 1189 1 FIELD 18A

COLL OF WILLIAM + MARY, VIRGINIA

STUDY OF PION AND MOON BEAM TRANSPORT SYSTEMS FOR A 600 MEV SYNCHROCYCLOTRON

H. O. FUNSTEN

P-1-NSG-636
10/65- 9/66

NASA

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GH 1230 2 FIELD 7D,20M,20J,20D

RENSSELAER POLYTC INST, NEW YORK

SPATIAL NUCLEATION AND CRYSTAL GROWTH

J. B. HUDSON

NSG-663
6/66- 5/67

NASA

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GH 1331 2 FIELD 20D,10B

PENNSYLVANIA ST UNIV, SCHOOL OF ENGINEERING, AERONAUTICAL ENGIN, PENNSYLVANIA

INVESTIGATIONS AND ANALYSES OF FLOW PHENOMENA OF SECONDARY MOTIONS IN AXIAL FLOW INDUCERS

B. LAKSHMINARAYANA, G. F. WISLICENUS

NSG-537-SP-4
4/65- 8/66

NASA

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GH 1232 1 FIELD 12A,13M,14B,20D

UNIV OF TENNESSEE, SCHOOL OF ENGINEERING, CHEMICAL + METAL ENGIN, TENNESSEE

CONSTITUTIVE EQUATIONS IN TWO-DIMENSIONAL FLOW

D. C. BOGUE, E. B. ADAMS

E-3-NSG-671
9/65- 8/66

NASA

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GH 1408 1 FIELD 5A,20H, 7D

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS, MARYLAND

THEORETICAL INVESTIGATIONS OF NUCLEAR REACTIONS AND STRUCTURE

W. M. MACDONALD, W. BERES

NSG-642-P-1
6/66- 5/67

NASA

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GPF 508 3 FIELD 20J,18A,20H, 7D

UNIVERSITY OF VIRGINIA, GRADUATE SCHOOL, PHYSICS, VIRGINIA

THEORETICAL NUCLEAR PHYSICS

M. E. ROSE, H. L. ACKER, V. DEVANATHAN
J. M. EISENBERG, H. P. KELLY
J. LETOURNEUX

AT-40-1-2915
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

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GPF 944 FIELD 5A,20I

UNIV OF TEXAS, AUSTIN, GRADUATE SCHOOL, PHYSICS, TEXAS

ANOMALOUS DIFFUSION AND THERMALIZATION OF TURBULENT PLASMAS

W. E. DRUMMOND, R. E. AAMODT
C. S. GARDNER, A. MACMAHON

AT(40-1)3458
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

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GPF 948 FIELD 5A,20I

RESEARCH ON OSCILLATIONS AND INSTABILITIES

F. W. CRAWFORD, M. CHODOROW, R. S. HARP
S. A. SELF

AT(04-3)-326-1
12/65-11/66

AEC-DIVISION OF PHYSICAL RES

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GPF 949 FIELD 20D, 5A,20L, 7B

UNIV OF MINNESOTA, GRADUATE SCHOOL, PHYSICS, MINNESOTA

EXPERIMENTAL AND THEORETICAL STUDIES IN SOLID STATE AND LOW TEMPERATURE PHYSICS

W. ZIMMERMAN, A. M. GOLDMAN, W. J. MULLIN
L. H. NOSANOW, W. V. WEYHMANN

AT(11-1)-1569
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

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GQA 231 1 FIELD 5A,20I

GAS DISCHARGES - PLASMA ARC

S. C. BROWN, S. M. BROWN

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

••••••••••

GQA 298 1 FIELD 5A,20I

GAS DISCHARGES - DIFFUSION IN A TURBULENT PLASMA

G. BEKEFI, G. M. BEKEFI

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

••••••••••

GQA 313 1 FIELD 12A, 5A,20I

GAS DISCHARGES - SCATTERING OF WAVES FROM A PLASMA-FILLED WAVEGUIDE

G. BEKEFI, G. M. BEKEFI

DA-36-039-AMC-03200E
/65- /

DOD-ARMY

••••••••••

GQA 342 1 FIELD 7D,20L, 7B

LEHIGH UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

SURFACE PROPERTIES OF GERMANIUM SEMICONDUCTORS

A. C. ZETTLEMOYER

DA-ARO-D-31-124-G525
/65- /

DOD-ARMY

••••••••••

GQA 361 2 FIELD 20D,20I,20J

SINGULAR-PERTURBATION METHODS APPLIED TO MAGNETO-GASDYNAMICS AND PLASMA PROBLEMS

I. CHANG

DA-ARO-D-31-124-G649
/65- /

DOD-ARMY

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GQA 428 2 FIELD 11F,11G,20D,20K

WICHITA STATE UNIV, SCHOOL OF ENGINEERING, AERONAUTICAL ENGIN, KANSAS

ANALYTICAL AND EXPERIMENTAL ANALYSIS OF AN INTEGRALLY STIFFENED PANEL SUBJECTED TO MECHANICAL AND THERMAL LOADING 4451

E. L. COOK

DA-ARO-D-31-124-G482
/65- /

DOD-ARMY

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GQA 432 2 FIELD 5A,20F,20I

UNIV OF TEXAS, AUSTIN, GRADUATE SCHOOL, PHYSICS, TEXAS

HELICAL ANOMALIES IN RF-PLASMAS

H. SCHLUTER

DA-ARO-D-31-124-G438
/65- /

DOD-ARMY

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GQF 219 7 FIELD 4A,20D,20K

HIGH SPEED LOW DENSITY AND IONIZED GAS FLOWS

R. VAGLIOLAURIN

AF-AFOSR-0409-62
/65- /

DOD-AIR FORCE

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GQF 297 7 FIELD 20L,20D,20K,10B

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, CALIFORNIA

AIRCRAFT AND MISSILE STRUCTURES OPERATING AT HIGH TEMPERATURES

N. J. HOFF

AF-49-638-01276
/65- /

DOD-AIR FORCE

****

GQF 480 8 FIELD 20I, 7B

AVCO RES. LAB., EVER, MASSACHUSETTS

PROPERTIES OF COLLISIONLESS PLASMAS

R. M. PATRICK

AF-49-638-01483
/65- /

DOD-AIR FORCE

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GQF 619 11 FIELD 20M, 5A,20F,20L

YALE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CONNECTICUT

SPECTROSCOPY OF INSULATING CRYSTALS AT LOW TEMPERATURES

R. G. WHEELER

AF-AFOSR-0873-65
/65- /

DOD-AIR FORCE

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GQF 695 11 FIELD 7C, 7D,20J, 5A

UNIV OF PITTSBURGH, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

ELECTRONIC PROPERTIES OF SOLIDS

F. KEFFER

AF-AFOSR-0196-63
/65- /

DOD-AIR FORCE

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GQF 741 11 FIELD 5A,20L

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

THEORY OF INTERACTING ELEMENTARY EXCITATIONS IN SOLIDS

R. A. FERRELL

AF-AFOSR-0735-65
/65- /

DOD-AIR FORCE

****

GQF 743 9 FIELD 20F,20L

PREPARATION PHYSICAL MEASUREMENTS + COLLATION OF CRYSTAL STRUCTURE PROPERTIES

R. PEPINSKY

AF-49-638-01406
/65- /

DOD-AIR FORCE

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GQF 782 6 FIELD 12A,13M,20L,20K

TECH HIGH SCH IN VIENA, AUSTRIA

STOCHASTIC THERMAL STRESSES

H. PARKUS

AF-61-052-00645
/65- /

DOD-AIR FORCE

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GQF 1002 7 FIELD 12A, 5A,18A, 7D

FLORIDA STATE UNIV, GRADUATE SCHOOL, PHYSICS, FLORIDA

LOW ENERGY RESEARCH USING A TANDEM VAN DE GRAAFF ACCELERATOR

R. H. DAVIS

AF-AFOSR-0440-65
/65- /

DOD-AIR FORCE

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GQF 1067 9 FIELD 5A,20L,20J, 7B

SYRACUSE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

COLLECTIVE EXCITATIONS IN SOLIDS

H. KAPLAN

AF-AFOSR-0420-63
/65- /

DOD-AIR FORCE

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GQF 1204 5 FIELD 20M,11G,11F, 5A

WAYNE STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MICHIGAN

MEGACYCLE AND KILOMEGACYCLE ULTRASONIC ATTENUATION IN METALS TEMPERATURES

H. V. BOHM

AF-AFOSR-0695-64
/65- /

DOD-AIR FORCE

****

GQF 1251 5 FIELD 20I, 7B

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, ILLINOIS

THERMOPHYSICAL PROPERTIES OF PLASMAS

A. B. CAMBEL

AF-49-638-01533
/65- /

DOD-AIR FORCE

****

GQF 2408 4 FIELD 5A,20L,20J, 7B

THEORY OF SOLIDS

H. SUHL

AF-AFOSR-0610-64
/65- /

DOD-AIR FORCE

****

GQF 2974 3 FIELD 7D,20J, 7B

MCGILL UNIV, GRADUATE SCHOOL, CHEMISTRY, CANADA

VARIATION OF NUCLEAR CHARGE DISTRIBUTION IN FISSION WITH BOMBARDING ENERGY

L. YAFFE

AF-AFOSR-0489-64
/65- /

DOD-AIR FORCE

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GQF 3118 3 FIELD 20M, 5A,20L

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, PHYSICS, NEW YORK

THEORY OF INTERACTION OF HIGH-FREQUENCY SOUND WAVES AND ELECTRONS

T. KJELDAAS

AF-49-638-01372
/65- /

DOD-AIR FORCE

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GQF 3182 3 FIELD 20M, 5A,18A, 7D

STANFORD UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

EXPERIMENTS AT LIQUID HELIUM TEMPERATURES ON MICROSCOPIC QUANTUM EFFECTS AND GENERAL RELATIVITY

W. M. FAIRBANK

AF-AFOSR-0348-63
/65- /

DOD-AIR FORCE

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GQF 3196 3 FIELD 5A,18A,20F

UNIV OF WESTERN ONT, GRADUATE SCHOOL, PHYSICS, CANADA

MM AND SUBMILLIMETER ELECTROMAGNETIC RADIATION

E. BRANNEN

AF-AFOSR-0297-65
/65- /

DOD-AIR FORCE

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GQF 3249 3 FIELD 20F

BAIRD ATOMIC, INC.,, MASSACHUSETTS

RESEARCH ON CIRCULAR POLARIZING OPTICAL MASERS

A. W. HORNIG

AF-49-638-01167
/65- /

DOD-AIR FORCE

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GQF 3304 2 FIELD 7C, 7A, 7D, 6B

UNIV OF NEW SO WALES, AUSTRALIA

RESEARCH ON POSITRONIUM

J. H. GREEN

AF-AFOSR-0961-65
/65- /

DOD-AIR FORCE

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GQF 3386 2 FIELD 7C, 7D,20L, 7B

OREGON STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, OREGON

AN INVESTIGATION OF PROCESSES OF CRYSTAL GROWTH

W. J. FREDERICKS

AF-AFOSR-0217-63
/65- /

DOD-AIR FORCE

****

GQF 3485 2 FIELD 9+, 5A,20F,20I

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

ROTATING R-F FIELD PLASMA

M. L. POOL

AF-AFOSR-0202-65
/65- /

DOD-AIR FORCE

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GQF 3486 2 FIELD 11F,11G, 5A,20F

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

SEMICONDUCTOR PHYSICS

J. P. MCKELVEY

AF-AFOSR-0073-63
/65- /

DOD-AIR FORCE

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GQF 3503 2 FIELD 18A,20F

UNIVERSITY OF VIRGINIA, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, VIRGINIA

DETERMINATION OF THE DEGREE OF IONIZATION OF GAS ATOMS AS A FUNCTION OF X-RAY ENERGY

H. S. LANDES

AF-AFOSR-0110-63
/65- /

DOD-AIR FORCE

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GQF 3534 2 FIELD 20M, 9+,20D, 5A

DARTMOUTH COLLEGE, GRADUATE SCHOOL, PHYSICS, NEW HAMPSHIRE

PVT RELATIONS IN SOLID HE3 AND SOLID HE4 - FLOW MEASUREMENTS WITH SUPERFLUID HELIUM

J. N. KIDDER

AF-49-638-01518
/65- /

DOD-AIR FORCE

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GQF 3547 2 FIELD 5A, 7D, 7B

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, PHYSICS, PENNSYLVANIA

FIELD OF LOW ENERGY NUCLEAR PHYSICS AND NUCLEAR SPECTROSCOPY

S. DEBENEDETTI

AF-AFOSR-0278-65
/65- /

DOD-AIR FORCE

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GQF 3571 2 FIELD 20J, 5A,20F,20D

UNIV OF MASSACHUSETTS, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

POLARIZATION OF LIGHT RESULTING FROM THE EXCITATION OF ATOMS BY ELECTRONS

E. A. SOLTYSIK

AF-AFOSR-0218-63
/65- /

DOD-AIR FORCE

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GQF 3573 2 FIELD 11G,11H,12A,13M

TRANSPORT AND TRANSFORMATION IN CONTINUA

L. E. SCRIVEN

AF-AFOSR-0219-63
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DOD-AIR FORCE

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GQF 3691 1 FIELD 12A,20H,20J

UNIV OF TEXAS, AUSTIN, GRADUATE SCHOOL, MATHEMATICS, TEXAS

RELATIVITY AND GRAVITATIONAL THEORIES

E. L. SCHUCKING, E. +. SCHUCKING

AF-AFOSR-0454-64
/65- /

DOD-AIR FORCE

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GQF 3710 1 FIELD 20D,20I

HEAT TRANSFER TO A MHD FLUID

L. FAN

AF-AFOSR-0463-64
/65- /

DOD-AIR FORCE

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GQF 3731 1 FIELD 3A,12A,20M,18A

MCDONNELL AIRCRAFT CO, MISSOURI

APPLICATION OF STOCHASTIC PROCESSES IN A PLASMA

B. KURSUNOGLU

AF-49-638-01260
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DOD-AIR FORCE

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GQF 3753 1 FIELD 20M,11F, 5A,20L

UNIV OF CONNECTICUT, GRADUATE SCHOOL, PHYSICS, CONNECTICUT

LOW TEMPERATURE PHYSICS RESEARCH

C. A. REYNOLDS

AF-AFOSR-0474-64
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DOD-AIR FORCE

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GQF 3936 FIELD 12A,20J, 5A,20H

KENT STATE UNIVERSITY, GRADUATE SCHOOL, OHIO

MULTIPOLE PROCESSION AND SINGLE QUANTUM ANNIHILATION OF POSITRONS

D. S. MOROI

AF-AFOSR-0774-65
/65- /

DOD-AIR FORCE

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GQF 3985 FIELD 7D,11G, 5A,20L

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, ENGIN PHYS + MAT SCI, NEW YORK

DEFECTS AND DIFUSSION ON IONIC CRYSTAL SURFACES

J. M. BLAKELY

AF-AFOSR-0780-65
/65- /

DOD-AIR FORCE

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GQF 4347 FIELD 11B,20L,20J

BATTELLE MEMORIAL IN, OHIO

THEORY OF FERRIMAGNETISM IN INSULATORS

R. P. KENAN

AF-AFOSR-0868-65
/65- /

DOD-AIR FORCE

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GQF 4355 FIELD 12A,20M, 5A,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

MANY-BODY PHYSICS

J. B. KELLER, J. K. PERCUS

AF-AFOSR-0965-65
/65- /

DOD-AIR FORCE

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GQF 4385 FIELD 5A,20F

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, PHYSICS, HAWAII

PROPERTIES OF GAS LASERS

J. R. HOLMES

AF-AFOSR-0917-65
/65- /

DOD-AIR FORCE

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GQF 4395 FIELD 9+

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

GAS LASER STUDIES IN 100 TO 1000 MICRON RANGE

P. D. COLEMAN

AF-AFOSR-0804-65
/65- /

DOD-AIR FORCE

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GQF 4405 FIELD 20M,11F,20L, 7B

CITY UNIV N Y NEW YORK, GRADUATE SCHOOL, NEW YORK

TRANSPORT PROPERTIES IN DILUTE ALLOYS WHICH EXHIBIT A LOCALIZED MOMENT

M. P. SARACHIK

AF-AFOSR-0894-65

/65- /

DOD-AIR FORCE

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GQF 4425 FIELD 18A, 7D,20L, 7B

UNIV OF BONN, GERMANY

EXTRANUCLEAR EFFECTS IN GAMMA-GAMMA ANGULAR CORRELATIONS

E. BODENSTEDT

AF-EOAR-0059-65
/65- /

DOD-AIR FORCE

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GQF 4436 FIELD 20I

MCDONNELL AIRCRAFT CO, MISSOURI

INJECTION AND CONFINEMENT OF HIGH TEMPERATURE PLASMAS

D. R. WELLS

AF-AFOSR-0844-65
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DOD-AIR FORCE

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GQF 4467 FIELD 5A, 7D,20J

UNIVERSITY OF OREGON, GRADUATE SCHOOL, PHYSICS, OREGON

STUDIES OF NUCLEAR REACTIONS AND STRUCTURE

I. E. MCCARTHY

AF-AFOSR-0947-65
/65- /

DOD-AIR FORCE

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GQF 4517 FIELD 5A,20F

UNIV OF ROCHESTER, GRADUATE SCHOOL, PHYSICS, NEW YORK

INTERACTIONS AND CORRELATIONS OF ELECTROMAGNETIC FIELDS

L. MANDEL

AF-49-638-01532
/65- /

DOD-AIR FORCE

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GQF 6721 1 FIELD 5A,20L, 7B

WESLEYAN UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CONNECTICUT

MOSSBAUER EFFECT IN THE STUDY OF SOLIDS

W. L. TROUSDALE

AF-AFOSR-0636-64
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DOD-AIR FORCE

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GQF 6723 1 FIELD 20M,20L, 7B

IBM RESEARCH CENTER, NEW YORK

BASIC ANTIFERROMAGNETIC STUDIES

D. J. TEANEY

AF-49-638-01379
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GQF 6793 1 FIELD 20F,20L

BATTELLE MEMORIAL IN, OHIO

INTERACTION OF HIGH-INTENSITY OPTICAL RADIATION WITH METALS

I. H. ADAWI

AF-AFOSR-0640-64
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DOD-AIR FORCE

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GQF 6807 1 FIELD 20J, 5A, 7B

YALE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CONNECTICUT

RELAXATION MECHANISMS AND NEW MEDIA IN GAS DISCHARGE LASERS

W. R. BENNETT

AF-AFOSR-0626-65
/65- /

DOD-AIR FORCE

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GQF 207061 3 FIELD 20D,10B,20I

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MICHIGAN

INVESTIGATION INTO THE CHARACTERISTICS OF THREE-PHASE ARC SYSTEMS

A. J. NICHOLS

AF-33-615-01326
/65- /

DOD-AIR FORCE

•••••••••

GQF 207356 8 FIELD 8D, 8G, 9+, 9A

RESEARCH ON IMPROVED II-VI CRYSTALS

L. R. SHIOZAWA

AF-33-615-02708
/65- /

DOD-AIR FORCE

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GQF 207369 13 FIELD 20M,20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON THE STRUCTURE + PROPERTIES OF II-VI COMPOUND SEMICONDUCTORS

D. C. REYNOLDS

/65- /

DOD-AIR FORCE

•••••••••

GQF 207371 7 FIELD 9+, 9C, 9A,20F

UNIV OF PARIS, FRANCE

ENERGY TRANSPORT PHENOMENA IN CADMIUM SULFIDE CRYSTALS

M. BALKANSKI

AF-61-052-00757
/65- /

DOD-AIR FORCE

•••••••••

GQF 207382 1 FIELD 20I

NORTHROP AIRCRAFT INC, HAWTHORNE, CALIFORNIA

INTERACTION OF A PRE-IONIZED GAS FLOW WITH AN ELECTRIC ARC

H. N. OLSEN

AF-33-615-01105
/65- /

DOD-AIR FORCE

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GQF 207419 FIELD 20D

SYS. RES. LAB. INC.,, OHIO

ENGINEERING + OTHER SUPPORT FUNCTIONS PERTINENT TO FLUID DYNAMICS RESEARCH PROJECTS

K. J. LANGHOUT

AF-33-615-02175
/65- /

DOD-AIR FORCE

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GQF 207432 FIELD 20M,20L,20A

BROWN UNIVERSITY, GRADUATE SCHOOL, RHODE ISLAND

ULTRASONIC STRESS WAVE ATTENUATION AND VELOCITY IN II-VI SEMICONDUCTORS

. NONE

AF-33-615-02946
/65- /

DOD-AIR FORCE

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GQF 207433 FIELD 11B,11F,11G,20L

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, MATERIALS SCIENCE, ILLINOIS

DEFECT INTERACTIONS AND RELAXATION PHENOMENA ASSOCIATED WITH ELECTRONIC MOTION IN SEMI-CONDUCTING CERAMICS

D. H. WHITMORE

AF-33-615-02610
/65- /

DOD-AIR FORCE

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GQF 207436 FIELD 11G,12A,20M,20J

USN, BUR NAV WEAP, DIST OF COLUMBIA

RESEARCH ON THE ESTIMATION OF SPECTRA AND RELATED QUANITIES FOR SELF ADJOINT OPERATORS

D. FOX

MIPR AS-0298-65
/65- /

DOD-AIR FORCE

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GQF 207491 FIELD 20D,20K,20I

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

HEAT TRANSFER IN MAGNETOHYDRODYNAMIC SYSTEMS

K. CRAMER

/65- /

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GQF 207551 FIELD 20F,20I, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

HIGH DENSITY PLASMA DYNAMICS

W. BRAUN

/65- /

DOD-AIR FORCE

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GQF 207554 FIELD 20F,20I, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

WAVE DISPERSION IN A CESIUM MAGNETO PLASMA

J. DECKER

/65- /

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GQF 207573 FIELD 6B, 9+, 9A,18A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON THE DETECTION OF LOW ENERGY PHOTONS

R. GEBEL

/65- /

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GQF 207575 FIELD 9+, 9C, 9A,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

GROWTH OF COMPOUND SEMICONDUCTOR CRYSTALS

L. GREENE

/65- /

DOD-AIR FORCE

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GQF 258312 1 FIELD 4A,20J,20F

GEOSC., INC., ALAMOG, NEW MEXICO

ENGINEERING SERVICES INCLUDING MAINTENANCE AND OPERATION OF OPTICAL FIELD EQUIPMENT

M. W. JONES

AF-19-628-03885
/65- /

DOD-AIR FORCE

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GQF 258388 3 FIELD 20M,20L

UNIV OF PARIS, FRANCE

STUDY OF RADIATION INDUCED DEFECTS IN SEMICONDUCTORS VIA ANNEALING KINETICS RESISTIVITY MEAS ETC

P. BARUCH

AF-61-052-00543
/65- /

DOD-AIR FORCE

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GQF 258398 1 FIELD 20F,20L, 7B

EAGLE-PICKER CO., MI, OKLAHOMA

INVEST OF OPTIMUM CONDITIONS FOR PREPARATION + EVALUATION OF HIGH PURITY SINGLE CRYSTAL BORON

J. R. MUSGRAVE

AF-19-628-03259
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GQF 258421 1 FIELD 11B,20L, 7B

MATERIALS RES CTR, NEW YORK

INVEST OF ELECTRON BEAM ZONE TECH FOR GROWTH OF HI-PURITY HI-PERFECTION SAPPHIRE +RUBY CRYSTALS

G. T. MURRAY

AF-19-628-04089
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DOD-AIR FORCE

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GQF 258450 2 FIELD 11B,11G,11F,13H

AVCO MFG CORP WILMIN, MASSACHUSETTS

INVEST OF PROPS IE COMPRESSIBILITY OF NON-METALLIC SOLIDS UNDER VARYING TEMP + PRESSURES

A. J. DELAI

AF-19-628-02943
/65- /

DOD-AIR FORCE

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GQF 258549 2 FIELD 9C, 9+,12A,20F

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, INDIANA

THEORETICAL STUDIES ON THE SCATTERING OF EM WAVES FROM IRREGULAR BODIES + REDUCTION TECHNIQUES

F. V. SCHULTZ

AF-19-628-01691
/65- /

DOD-AIR FORCE

•••••••••

GQF 258551 2 FIELD 9+, 9A,12A, 9C

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, WASHINGTON

CONDUCT THEORETICAL + EXPERIMENTAL STUDIES OF EM RADIATION IN ISO- ANISO- + GYROTROPIC MEDIA

A. ISHIMARU

AF-19-628-02763
/65- /

DOD-AIR FORCE

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GQF 258558 2 FIELD 11F,11G,20F,20L

FRANKLIN INSTITUTE, PENNSYLVANIA

RESEARCH ON PREPARATION + ANALYSIS OF SINGLE THIN CRYSTALS OF MAGNETIC MATERIALS

W. DOYLE

AF-19-628-02415
/65- /

DOD-AIR FORCE

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GQF 258686 3 FIELD 3A, 8K, 5A,20F

TEMPLE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

RESEARCH ON EXPLODING WIRE PHENOMENA PARTICULARLY AT HIGH AND LOW AMBIENT PRESSURES

T. KORNEFF

AF-19-628-00215
/65- /

DOD-AIR FORCE

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GQF 258762 FIELD 3C, 3A, 5A,20I

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

RESEARCH ON SHOCK WAVES IN TENUOUS GASES UNDER COLLISIONESS CONDITIONS

J. S. GOLDSTEIN

AF-19-628-04019
/65- /

DOD-AIR FORCE

•••••••••

GQF 258943 FIELD 20I

THEORETICAL + EXPERIMENTAL STUDIES ON COLLISIONAL PROCESSES IN PLASMAS

H. J. OSKAM

AF-19-628-04794
/65- /

DOD-AIR FORCE

•••••••••

GQF 259088 2 FIELD 9+,11G,20F,20L

DEVICE DEVELOPMENT, MASSACHUSETTS

INVESTIGATION OF OPTICAL BONDING TECHNIQUES ON THIN FILM FERRO-MAGNETIC CRYSTALLINE MATERIALS

. NONE

AF-19-628-03237
/65- /

DOD-AIR FORCE

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GQF 259112 FIELD 12A,20H,20F

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

RESEARCH ON THE DIFFRACTION + SCATTERING OF EM WAVES BY REGULAR SHAPED CONDUCTING BODIES

R. E. KLEINMAN

AF-19-628-04328
/65- /

DOD-AIR FORCE

•••••••••

GQF 259546 FIELD 20F,20J, 7B

STUDY INELASTIC CROSS-SECTION + SCATTERING OF KILOVOLT ELECTRON + PROTON COLLISIONS WITH N2

R. G. BREENE

AF-19-628-05174
/65- /

DOD-AIR FORCE

•••••••••

GQF 259932 FIELD 11B,11F,11G,20L

INVEST OF CRYSTAL EFFECTS CAUSED BY DIFFUSION OF IMPURITIES + EFFEC ON ELEC PROPS OF SEMICONDUCTORS

. NONE

AF-19-628-05059
/65- /

DOD-AIR FORCE

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GQF 259941 FIELD 9+, 9A,20F,20L

SPERRY RAND RES CENTER, SUDBURY, MASSACHUSETTS

STUDY INTERACTION PROCESSES OF MAG SPINS

+ THEIR ENVIRONMENT IN MIXED ALKALI HALIDES + TRANSITION METALS

• NONE

AF-19-628-05128
/65- /

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GQF 259947 FIELD 20M,11G,20F,20D

ILLINOIS INST OF TECH, GRADUATE SCHOOL, ILLINOIS

STUDY OF THE PRESSURE DEPENDENCE OF THE INFRARED SPECTRA OF SOLIDS

• NONE

AF-19-628-05144
/65- /

DOD-AIR FORCE

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GQF 284862 FIELD 7A, 7D,20M,12A

USDC, NATL BUR STAN, DIST OF COLUMBIA

DENSITY EFFECTS ON REAL GAS PROPERTIES

M. KLEIN

/65- /

DOD-AIR FORCE

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GQF 284869 FIELD 11C,20D,20L, 7B

LITTON SYSTEMS INC, ST PAUL, MINNESOTA

DEPTH OF PENETRATION

G. K. WEHNER

AF-33-615-02165
/65- /

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GQQ 595150 5 FIELD 7C, 7D, 7A,20J

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, CHEMISTRY, NORTH CAROLINA

ELECTRICAL AND OPTICAL PROPERTIES OF ORGANIC SOLIDS

R. C. JARNAGIN

SD-100
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595154 1 FIELD 11F,11G, 5A,20L

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, PHYSICS, NORTH CAROLINA

ATOM MOBILITY IN CRYSTALS

L. SLIFKIN, A. L. LASKAR

SD-100
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595155 1 FIELD 20M,11G, 5A,20L

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, PHYSICS, NORTH CAROLINA

IMPERFECTIONS IN IONIC CRYSTALS

L. SLIFKIN, C. CHILDS, L. ROWAN

SD-100
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DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595192 FIELD 20M,20L,20D,20J

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, CHEMISTRY, NORTH CAROLINA

THERMODYNAMIC PROPERTIES OF LIQUID HELIUM

D. K. RICE, O. G. ENGEL, B. WIDOM

SD-100
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595219 2 FIELD 20M,11B,11F,11G

HIGH TEMPERATURE EMISSIVITY

E. SCALA

SD-68
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595245 FIELD 20M, 5A,20L, 7B

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

UPPER CRITICAL FIELD OF TYPE 2 SUPERCONDUCTORS

R. E. GLOVER, R. BROWN

SD-101
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595251 1 FIELD 9+,20J, 5A,20F

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

OPTICAL PUMPING STUDIES OF RUBIDIUM

C. O. ALLEY, L. ERICH, L. HAIMEN

SD-101
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595254 FIELD 5A, 7B

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

STIMULATED RAMAN SCATTERING IN NITROGEN

C. O. ALLEY, S. K. POULTNEY, G. SINGH

SD-101
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595265 1 FIELD 11F,13M,11G,20L

SHORT RANGE ORDER

R. M. ASIMOW

SD-101
/65- /

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GQQ 595271 7 FIELD 5A,20L, 7B

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

POLAR REFLECTION FARADAY EFFECT IN METALS

E. A. STERN, A. J. MCALISTER
J. C. MCGRODDY

SD-101
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GSE 785 1 FIELD 20D

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, AERONAUT + ENGIN SCI, INDIANA

THEORETICAL AND EXPERIMENTAL STUDIES IN FLUID MECHANICS

P. S. LYKOUDIS

NSF-GK-181
3/66- 3/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GSE 895 FIELD 7C, 7D,20M, 7B

THERMODYNAMIC AND TRANSPORT PROPERTIES OF DENSE FLUID SYSTEMS

F. KURATA, G. W. SWIFT

NSF-GK-705
11/65-11/66

NSF-ENGINEERING SCIENCES DIVISION

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GSE 897 FIELD 20M,20L, 7B

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

TUNNELING IN SEMICONDUCTORS

J. J. LOFERSKI

NSF-GK-727
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

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UNIFICATION OF THEORY OF NEUTRON MULTIPLYING SYSTEMS

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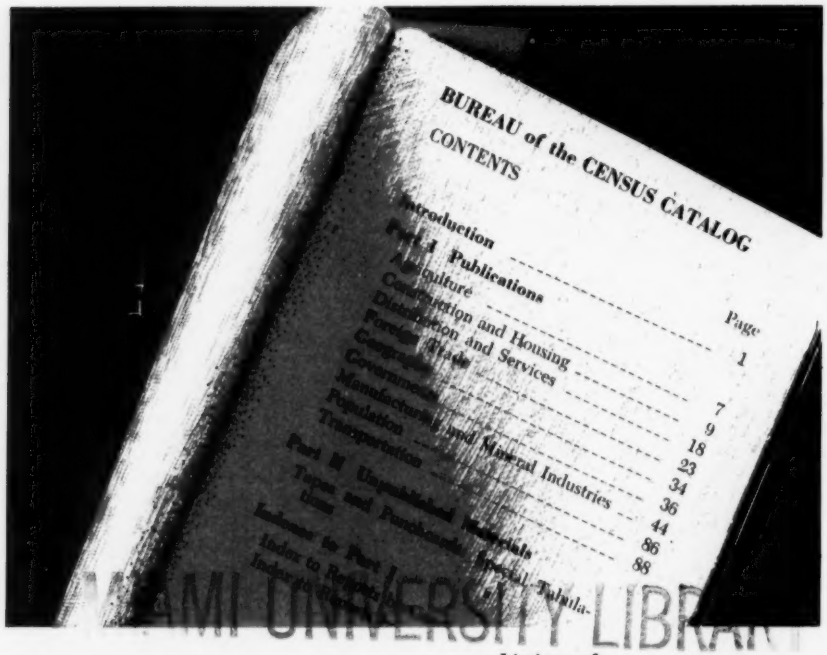

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